

Fishery Management Report No. 01-12

Management Report for the Stocked Waters Program, Region III, 1999-2000

by

Cal Skaugstad

December 2001

Alaska Department of Fish and Game

Division of Sport Fish



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the *Système International d'Unités* (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition.

Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H_A
deciliter	dL			base of natural logarithm	e
gram	g	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	catch per unit effort	CPUE
hectare	ha	and	&	coefficient of variation	CV
kilogram	kg	at	@	common test statistics	F, t, χ^2 , etc.
kilometer	km	Compass directions:		confidence interval	C.I.
liter	L			correlation coefficient	R (multiple)
meter	m	east	E	correlation coefficient	r (simple)
metric ton	mt	north	N	covariance	cov
milliliter	ml	south	S	degree (angular or temperature)	°
millimeter	mm	west	W	degrees of freedom	df
		Copyright	©	divided by	÷ or / (in equations)
		Corporate suffixes:			
		Company	Co.	equals	=
		Corporation	Corp.	expected value	E
		Incorporated	Inc.	fork length	FL
		Limited	Ltd.	greater than	>
		et alii (and other people)	et al.	greater than or equal to	≥
		et cetera (and so forth)	etc.	harvest per unit effort	HPUE
		exempli gratia (for example)	e.g.,	less than	<
		id est (that is)	i.e.,	less than or equal to	≤
		latitude or longitude	lat. or long.	logarithm (natural)	ln
		monetary symbols (U.S.)	\$, ¢	logarithm (base 10)	log
		months (tables and figures): first three letters	Jan,...,Dec	logarithm (specify base)	log ₂ , etc.
		number (before a number)	# (e.g., #10)	mid-eye-to-fork	MEF
		pounds (after a number)	# (e.g., 10#)	minute (angular)	'
		registered trademark	®	multiplied by	x
		trademark	™	not significant	NS
		United States (adjective)	U.S.	null hypothesis	H_0
		United States of America (noun)	USA	percent	%
		U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	probability	P
				probability of a type I error (rejection of the null hypothesis when true)	α
				probability of a type II error (acceptance of the null hypothesis when false)	β
				second (angular)	"
				standard deviation	SD
				standard error	SE
				standard length	SL
				total length	TL
				variance	Var
Weights and measures (English)					
cubic feet per second	ft ³ /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
Time and temperature					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
hour	h				
minute	min				
second	s				
Physics and chemistry					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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REGION III, 1999-2000**

by
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Division of Sport Fish

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
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December 2001

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PREFACE

The Alaska Department of Fish and Game is the fish and wildlife management agency for the State of Alaska. The department consists of six divisions (three management divisions and three with other purposes). Sport Fish Division is one of the management divisions. The goals of Sport Fish Division are to conserve wild stocks of sport fish, to provide a diversity of recreational fishing opportunities, and to optimize social and economic benefits from recreational fisheries. In order to implement these goals, the Division has instituted a fisheries management process.

This report is one of a series of Area Management Reports (AMRs) providing the 1999 - 2000 updates of fisheries management information about important sport fisheries within Sport Fish Division's Region III. Information is presented in this report for the Lower Tanana River Drainage Management Area (LTMA), Upper Tanana River Drainage Management Area (UTMA) and, Upper Copper Upper Susitna Management Area (UCUS). The report is written to make information available to the State Board of Fisheries, Fish and Game Advisory Committees, the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. Also included are descriptions of the fisheries regulatory process, the geographic area covered, and administrative, regulatory, and assessment project boundaries germane to the LTMA. This report also describes funding sources for Sport Fish Division programs, and provides information about Fish Stocking programs and other Sport Fish Division management programs within the Region.

Fisheries stock assessment research projects are developed, scheduled, and implemented to meet information needs identified by fisheries managers. Biological information gathered during the course of these research projects is combined with effort information and input from user groups and is used to assess the need for and to develop fisheries management plans and propose regulatory strategies.

There is an annual Regional Area Review meeting in mid-winter during which the current status of important area fisheries is presented and research needs are identified. The area review is followed in a few weeks by a series of operational planning meetings to begin the final development and planning of the fisheries research projects that will be undertaken during the next year. Both ongoing and new research projects are considered during operational planning.

A combination of funds from the State of Alaska Fish and Game (F&G) and Federal Aid in Fisheries Restoration (D-J) primarily support Sport Fish Division management and research activities. The F&G funds come from the sale of fishing licenses. The D-J (Dingle-Johnson, named after the congressmen who wrote the act) funds are from a Federal tax on fishing tackle and equipment. D-J funds are provided to the states at a match of up to three-to-one with the F&G funds. There is also an amendment to the D-J Act (W-B, for Wallop-Breaux) that provides money to states for boating access projects at the same three-to-one match with F&G funds. Funding Source for W-B money is a tax on boat gas and equipment. Other, peripheral funding sources can include contracts with various government agencies and the private sector.

INTRODUCTION AND BACKGROUND

REGION III DESCRIPTION

The Alaska Board of Fisheries (BOF) has divided the State of Alaska into ten regulatory areas for the purpose of organizing the sport fishing regulatory regime by drainages and fisheries. These areas (not to be confused with Regional management areas) are described in Title 5 of the Alaska Administrative Code (5 AAC). Sport Fish Division of the Alaska Department of Fish and Game (ADF&G) divides the state into three administrative regions with boundaries roughly corresponding to groups of the BOF regulatory areas (Figure 1). Region I is Southeast Alaska, Region II covers portions of Southcentral Alaska, Kodiak, Southwestern Alaska, and the Aleutian Islands. Region III includes two and most of a third of the BOF fishery regulatory areas. They are the Upper Copper and Upper Susitna regulatory area, the Arctic-Yukon-Kuskokwim regulatory area, and the Tanana River drainage.

Region III is the largest region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region encompasses about 526,000 mi² (1,357,080 km²) of Alaska, some of the state's largest river systems (Yukon, Kuskokwim, Colville, Noatak, and upper Copper River and upper Susitna River), thousands of lakes, and thousands of miles of coastline and streams. Regional coastline boundaries extend from Sheldon Point in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is sparsely populated. The most densely populated center is located in the Tanana River valley with Fairbanks (population about 31,000) being the largest community. The Regional Headquarters office is located in the Creamer's Field Wildlife Refuge in Fairbanks.

For administrative purposes Sport Fish Division has divided Region III into six fisheries management areas (Figure 1). They are:

- (1) The Northwestern Management Area (Norton Sound, Seward Peninsula and Kotzebue Sound drainages).
- (2) The Arctic - Yukon - Kuskokwim (AYK) Management Area (the North Slope drainages, the Yukon River drainage above Paimute except the Tanana River drainage, and the Kuskokwim River drainage upstream from the Aniak River).
- (3) The Lower Yukon/Lower Kuskokwim (LYLK) Management Area (the Yukon Drainage below Paimute and the Kuskokwim Drainage downstream from and including the Aniak River drainage), which was created and added to Region III in 1999.
- (4) The Upper Tanana River (UTMA) Management Area (The Tanana River drainage upstream from Banner Creek and the Little Delta River, Figure 3).
- (5) The Lower Tanana River (LTMA) Management Area (The Tanana River drainage downstream from Banner Creek and the Little Delta River; Figure 2).
- (6) The Upper Copper/Upper Susitna (UCUS) Management Area (the Copper River drainage and the Susitna River drainage above the Oshetna River), which was added to Region III in 1997 (Figure 4).

Area offices for the six areas are located in Nome/Fairbanks, Fairbanks, Bethel, Glennallen, Delta Junction, and Fairbanks, respectively.

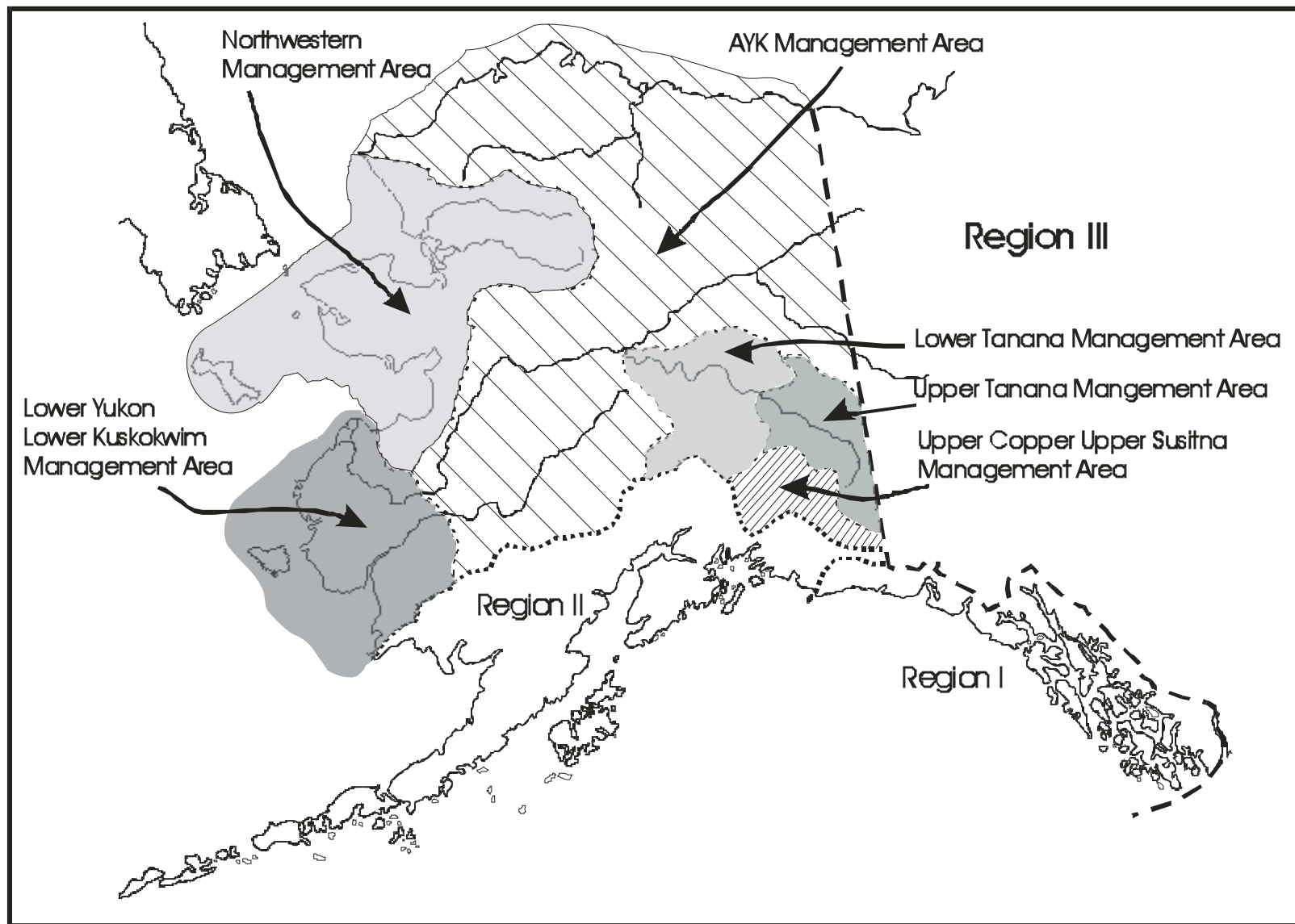


Figure 1.-Map of the sport fish regions in Alaska and the six Region III management areas.

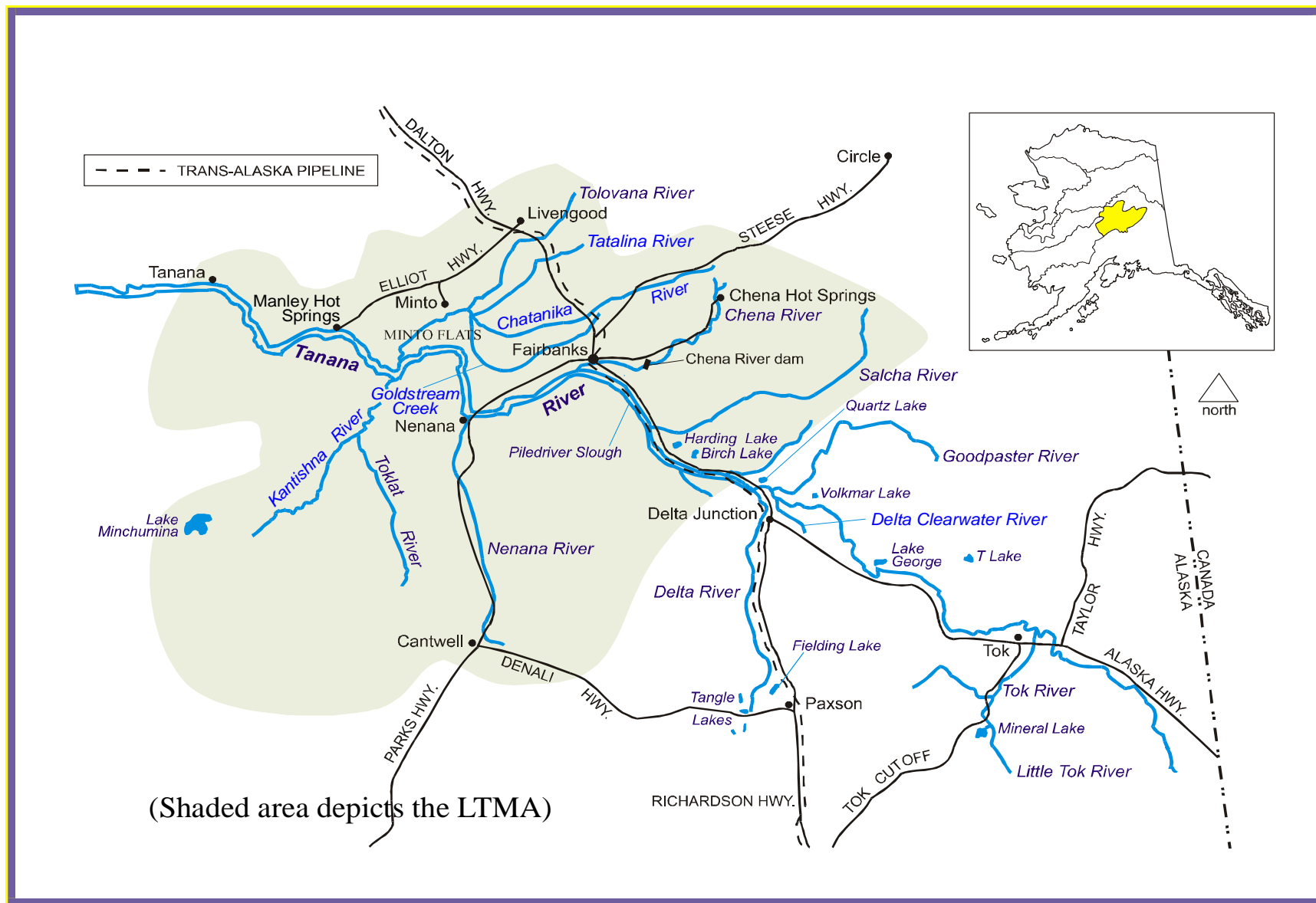


Figure 2.- Map of the Lower Tanana River Management Area (LTMA).

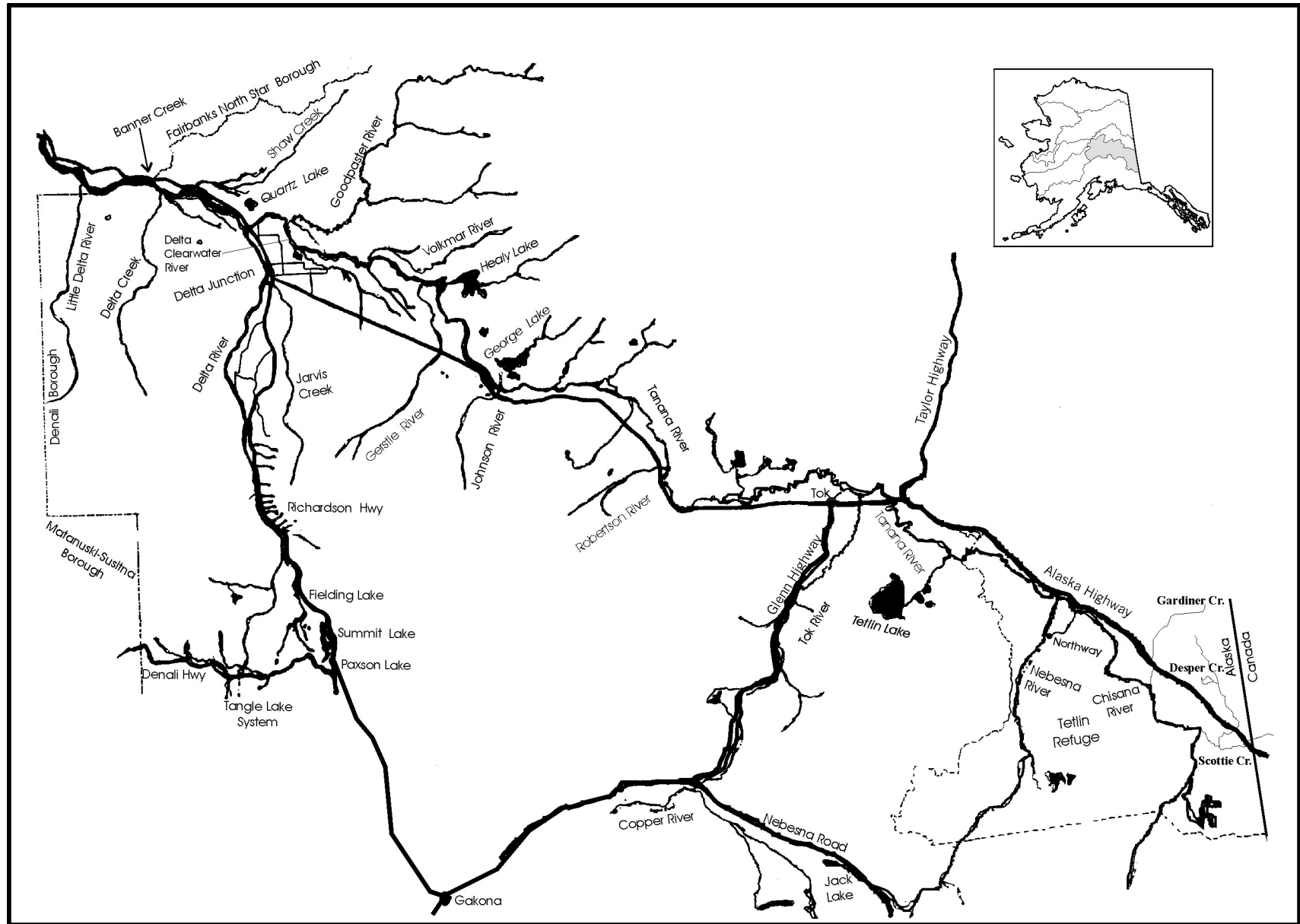


Figure 3.-Map of the Delta Management Area within the Tanana River drainage.

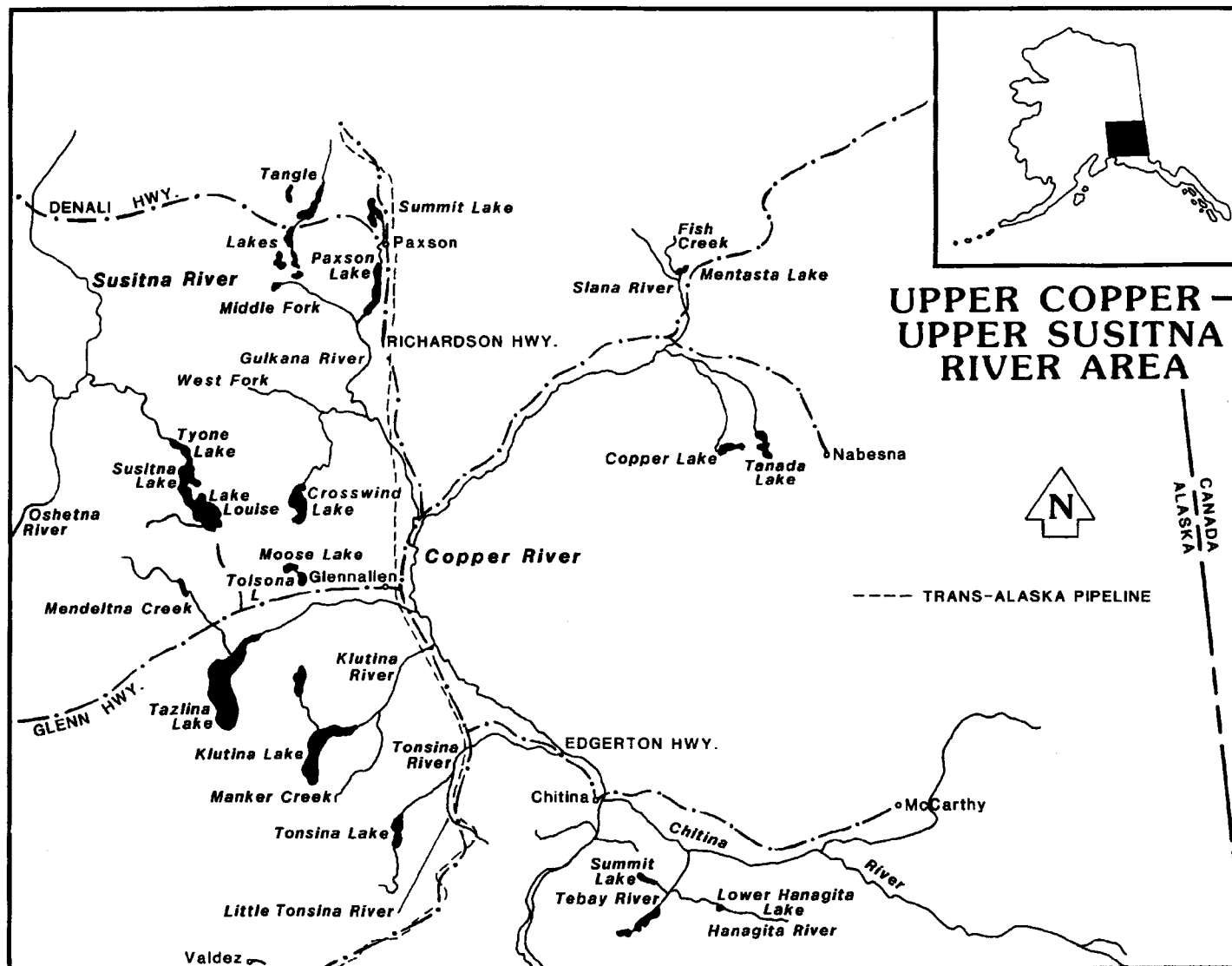


Figure 4.-Map of the Upper Copper/Upper Susitna Management Area.

THE ALASKA BOARD OF FISHERIES

The Alaska Board of Fisheries (BOF) is the seven-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates many fishery conservation plans for the State of Alaska. Sport, Subsistence, Personal Use, and Commercial fisheries are regulated on State Waters by the BOF. Board members are appointed to 3-year terms by the Governor and must be confirmed by the legislature. There is a parallel Board of Game that deals with wildlife management issues, hunting, and trapping.

Statewide fisheries issues may be considered at any BOF meeting. Under the current operating schedule, the BOF considers fishery issues for regulatory areas or groups of regulatory areas on a three-year cycle. The BOF meetings are usually in the wintertime, between early October and late March. Regulation proposals and management plans are received for evaluation by the BOF from ADF&G, local advisory committees, special interest organizations, and the general public (any Alaskan can submit a proposal to the BOF). During its deliberations the BOF receives input and testimony through oral and written reports from staff of the Alaska Department of Fish and Game, members of the general public, representatives of local fish and game Advisory Committees, and special interest groups such as fishermen's associations and clubs.

ADVISORY COMMITTEES

Local Fish and Game Advisory committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. Advisory committee members are individuals from the local public who are nominated and voted on by all present during an advisory committee meeting. They serve for three years. Most active committees meet in the fall and winter on a monthly basis, usually prior to Board meetings. Advisory meetings allow opportunity for direct public interaction with department staff answer questions and providing clarification concerning proposed regulatory changes. The Boards Support Section within the Division of Administration provides administrative and logistical support for the BOF and Fish and Game Advisory Committees. During 1999-2000, the department had direct support responsibilities for 56 Advisory committees in the state. Jim Marcotte is the Interior Region coordinator, stationed in Fairbanks.

ADF&G EMERGENCY ORDER AUTHORITY

The ADF&G has emergency order (E.O.) authority (5 AAC 75.003) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation issues that arise that are not adequately controlled by existing regulations. In that scenario, E.O.s deal with the situation until it is resolved or the BOF can formally take up the issue. Emergency Orders are also the mechanism by which "in-season" management of fisheries is accomplished. In-season management is usually in accordance with a fisheries management plan approved by the BOF.

FEDERAL REGIONAL ADVISORY COUNCILS

Under ANILCA (the Alaska National Interest Lands Conservation Act) the Federal Government requires the State of Alaska to establish use of fish and game by rural residents as the top priority of possible uses, and establishes Federal rules to which the state priority must conform. This is unconstitutional under state law, which requires equal access to those resources for all citizens. Should the state not amend the constitution of the State of Alaska to implement the Federal law,

managers of Federal Lands in Alaska are obligated by ANILCA to implement that priority on Federal Lands. The Constitution of the State of Alaska has not been amended.

A Federal System has been created that establishes 10 federally funded Regional Advisory Councils (RACs) providing recommendations to ensure that the rural priority for fish and game use is implemented on federal lands statewide. The RACs make recommendations to a Federal Subsistence Board, which then codifies them into Federal law. As of 2000, implementation of this system to regulate Alaska's fisheries on federal land was proceeding, and RACs were meeting to consider fisheries proposals.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

The Region III Sport Fish Division staff biologists are organized into a research staff and a management staff. The management staff consists of a management supervisor, an area management biologist (AMB) for each of the six management areas, one or more assistant area management biologists (for all areas combined, not six assistant AMBs), and two stocked waters biologists. The area biologists evaluate fisheries and propose and implement management strategies through plans and regulations in order to meet divisional goals, and may have one or more assistants. Interaction with the BOF, Advisory Committees, and the general public is an important part of their job. The stocked waters biologists plan and implement the regional stocking program for recreational fisheries, and have one or more field assistants.

There is an Access Coordinator to administer the Regional fishing and boating access program, who is also the Assistant Area Biologist assigned to the Region III Headquarters Office in Fairbanks. The Access Coordinator has an assistant who manages the construction and mapping components of the Access program.

An information officer was added to the Region III Sport Fish Division staff in 2000, and charged with the responsibility of organizing and upgrading the sport fishery outreach and information programs.

The research staff consists of a research supervisor, eight research biologists (in 2000), and various field assistants. The research biologists plan and implement fisheries research projects in order to provide information needed by the management group to meet divisional goals. The duties of the management and research biologists overlap somewhat.

THE STATEWIDE HARVEST SURVEY

Recreational angling effort and catch and harvest of important sport fish species in Alaska has been estimated and reported annually by Sport Fish Division's Research and Technical Services Section (RTS) since 1977 (Mills 1979-1994; Howe et al. 1995-1996, 2001a, b, c). The Statewide Harvest Survey (SWHS), a questionnaire mailed out to a random selection of sport fish license purchasers, is the instrument that provides the data which is analyzed to make these estimates. Estimates for a particular year usually become available in August and September of the following year, and the report is published sometime after that. Effort, catch, and harvest are estimated on a site-specific basis, but estimates of effort directed toward a single species and the resulting species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Effort tables are provided in this report where the estimated effort may be species-specific. Effort is estimated as number of anglers, number of trips, and most importantly, days fished. Utility of the estimates is strongly dependant on the number of responses for a site (Mills and Howe 1992). Estimates based on 12 or less responses are useful only to document that

fishing occurred. Twelve to 29 responses produce estimates useful for indicating relative order of magnitude and for assessing long-term trends, and estimates based on 30 or more responses are generally an accurate measure of harvest and catch numbers.

ORGANIZATION OF THIS REPORT

The scope of this report is the fish stocking program in Region III. Only actions, plans, and issues that pertain to the stocking program are presented. Wild fish populations are not discussed unless they are affected by stocking activities. This report is organized into 9 major sections. Section I provides an overview of the three management areas where most fish stocking activities occur. Included are descriptions of the management areas, staffing, the Statewide Harvest Survey, angling opportunity, regulations and regulatory actions that pertain to the stocking program, recent activities of the State Board of Fisheries and the local Fish and Game Advisory Committees. Section II, III, and IV present fishery descriptions for each of the three management areas including current sport fishing regulations, fishery management plans and statistics and fish stocking schedules. Section V describes various state policies that affect the stocking program. Section VI presents the different strategies and fish that are used in the stocking program. Section VII summarizes hatchery reviews for 1999 and 2000. Section VIII summarizes recent projects and Section IX presents current projects, activities, planned fish stockings and other issues.

All effort, catch, and harvest information in this report is derived from the SWHS estimates cited above unless otherwise specified. Generally the estimates for the most recent year will not have been published as this report is written, but final estimates will be available from RTS in draft form and will appear in this report.

Because this report is written for a diverse readership, most units of measure are given using the English system (miles, acres, river miles, etc.). Readers conversant with and preferring the metric system should have no trouble converting the measurements mentally.

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The stocked waters program encompass three management areas within Region III: The Lower Tanana and Upper Tanana River drainage and the Upper Copper River / Upper Susitna River drainages.

Lower and Upper Tanana River Drainage Management Areas

The Tanana River drainage is the second largest tributary of the Yukon River. The Tanana River basin (Figure 2) drains an area approximately 45,155 mi² (116,500 km²). The mainstem Tanana River is a large glacial stream formed by the confluence of the Chisana and Nabesna rivers near Tok and the Alaska - Canada border. The river flows generally northwest for some 570 river miles (917-km) to the Yukon. The confluence of the Tanana and Yukon rivers, near the village of Tanana, is 695 river miles from the mouth of the Yukon on the Bering Sea coast. Much of the human population in Region III is located within the Tanana River drainage along the Alaska, Richardson and Parks highways, and along the road system around Fairbanks. These highways and their secondary roads provide much of the access to sport fisheries.

Sport Fish Division divides the Tanana River drainage into two management areas - the Lower Tanana River Drainage Management Area (LTMA, commonly called the "Fairbanks

Management Area"), and the Upper Tanana River Drainage Management Area (UTMA, commonly called the "Delta Management Area").

The LTMA (Figure 2) consists of all waters of the Tanana River drainage downstream from the Banner Creek drainage flowing into the Tanana from the north and the nearby Little Delta River drainage on the south. Communities and municipalities located within the LTMA include Nenana, Anderson, Healy, Cantwell, Manley, Livengood, Minto, Fairbanks, Ft. Wainwright, North Pole, Eielson AFB, Salcha, Two Rivers, Chatanika, Fox, and Ester. The Fairbanks North Star Borough lies entirely within the LTMA. A portion of the Denali Borough is included within the LTMA.

The UTMA (Figure 3) consists of all waters of the Tanana River drainage upstream from the Banner Creek drainage and the Little Delta River. Communities located within the Upper Tanana drainage are Big Delta, Delta Junction, Fort Greely, Dot Lake, Tanacross, Mansfield, Tok, Tetlin, Northway, and Nabesna. The UTMA includes the Alaska portion of the White River the Tangle Lakes System (Delta River) along the Denali Highway and the headwaters of the Nabesna River

Upper Copper-Upper Susitna Drainages Management Area

The Upper Copper River-Upper Susitna River sport fish management area consists of all waters and drainages of the Copper River upstream from a line crossing the Copper River between the south bank of the mouth of Haley Creek and the south bank of the mouth of Canyon Creek in Wood Canyon, and all waters and drainages of the Upper Susitna River upstream from the confluence of the Oshetna River (Figure 4). Located within the UCUSMA are the communities of Glennallen, Gulkana, Gakona, Chitina, McCarthy, Kenny Lake, Copper Center, Paxson, Mentasta, and Slana. Three of the state's major highways (Edgerton, Glenn and Richardson), together with numerous secondary roads and trails, provide good access to most of the area's sport fisheries. Float-equipped aircraft are commonly used during the summer to access the area's many remote lake and stream fisheries not accessible by road. Snowmachines are the popular mode of travel to remote fisheries in the winter. Principal land managers in the UCUSMA are the National Park Service (Wrangell-St. Elias National Park), Bureau of Land Management (Gulkana Wild River), Ahtna Incorporated, and the Alaska Department of Natural Resources.

MANAGEMENT STAFFING

The Stocked Waters Program encompasses all of Region III but most fish stocking, management, and research activities occur within the Tanana River drainage and the Upper Copper-Upper Susitna River drainages. A Fisheries Biologist III, Cal Skaugstad, and a Fisheries Biologist II, Jim Fish manage the program. Both positions are 12 months and are based in Fairbanks. One to five seasonal Fishery Technicians assist the biologists through out the year. The technician positions last from two weeks to five months.

The current Area Management Biologist for the LTMA is Mike Doxey who is stationed in Fairbanks. Fronty Parker is the current Area Management Biologist for the UTMA. He is stationed in Delta Junction. Tom Taube is the current UCUSMA Management Biologist and is stationed in Glennallen.

THE STATEWIDE HARVEST SURVEY

In the Statewide Harvest Survey, the two management areas within the Tanana River drainage are referred together as Statistical Area U. While most sites for which effort, catch, and harvest are estimated are clearly within one of the two management areas, a few such as the "Middle Tanana River", "Other Lakes", and "Other Streams", overlap both areas. An attempt has been made to segregate those estimates into components for each management area.

The UCUSMA is Statistical Area I. Most of the stocked lakes in the UCUSMA are included in the category "Other Lakes" because, individually, there are too few respondents to the Statewide Harvest Survey to generate reliable estimates. However, a reliable estimate can be obtained for the stocked lakes as a group.

The following guidelines (Mills and Howe 1992) have been provided to evaluate the utility of statewide survey estimates, which is dependent on the number of responses for a given site:

- Other than to document that sport fishing occurred, estimates based on fewer than 12 responses should not be used,
- Estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long-term trends,
- Estimates based on 20 or more responses are generally usable.

In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation.

DIVERSITY OF ANGLING OPPORTUNITY

Tanana River Drainage

Angling within the LTMA and UTMA occurs at numerous lakes, ponds, and streams. Some are accessible directly from the road system. Most of these road-accessible waters have some sort of a boat launch accommodating watercraft appropriate to the size and characteristics of the waterbody. Access to off-road waters can be through a short walk, overland use of all terrain vehicles (ATVs), snowmachines, cross-country skis, or sled dogs (in which frozen rivers and lakes are added to the pathways), boats, and light aircraft suitable for landing on rough strips or gravel bars or equipped with floats or skis.

Fishing guides, outfitters, and transporters take anglers to areas of better quality fishing. Most transport is by aircraft or boat. Some commercial operators provide cabins or some sort of shelter, and boats for angler use. There were no commercial enterprises characterizing themselves as fishing lodges in the LTMA in 1999 - 2000.

Indigenous (wild stocks) and introduced (produced in hatcheries and stocked) fish are available to anglers. There are 18 fish species indigenous to the Tanana River drainage and sport anglers commonly target ten. The ten include: chinook salmon *Oncorhynchus tshawytscha*, coho salmon *Oncorhynchus kisutch*, chum salmon *Oncorhynchus keta*, Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, lake trout *Salvelinus namaycush*, sheefish (inconnu) *Stenodus leucichthys*, least cisco *Coregonus sardinella*, humpback whitefish *Coregonus pidschian*, and northern pike *Esox lucius*. Dolly Varden char *Salvelinus malma*, round whitefish *Prosopium cylindraceum* and broad whitefish *Coregonus nasus* are taken occasionally by anglers. Longnose suckers *Catostomus catostomus*, Alaska blackfish *Dallia pectoralis*, lake chub *Couesius plumbeus*, slimy

sculpins *Cottus cognatus* and Arctic lamprey *Lampetra japonica* are present but not targeted by anglers. Suckers and lampreys are sometimes used for bait.

Rainbow trout *Oncorhynchus mykiss* are not native to the drainage, but have been stocked in many locations. Arctic char *Salvelinus alpinus*, coho salmon, chinook salmon, Arctic grayling, and lake trout are also stocked in selected waters of the Tanana River drainage.

Angling opportunity is available year-round. Fishing may occur in all waters where game fish are present during the summer. Winter effort focuses on stocked lakes, with some effort directed toward lake and river populations of burbot and northern pike.

Upper Copper-Upper Susitna Drainages

The UCUSMA offers a unique blend of freshwater fishing opportunities to sport anglers, personal use, and subsistence participants. Three species of Pacific salmon (chinook *Oncorhynchus tshawytscha*, coho *O. kisutch*, and sockeye *O. nerka*) are available to anglers fishing upper Copper River drainage waters. The upper Susitna River drainage has no anadromous salmon. A velocity barrier in Devil's Canyon prevents upstream migration in the Susitna River. Anglers can also target coho salmon stocked in several landlocked lakes of the UCUSMA.

Popular fisheries also occur on the area's resident stocks of Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, Dolly Varden *S. malma*, rainbow and steelhead trout *O. mykiss*, and lake trout *Salvelinus namaycush*. Smaller fisheries occur on the area's resident stocks of whitefish *Coregonus* and *Prosopium* spp.

Currently, thirty lakes in the UCUSMA are stocked with Arctic grayling, rainbow trout, coho salmon, and Arctic char *S. alpinus*. The stocked fish are reared at state-owned hatcheries on Fort Richardson and Fort Elmendorf in Anchorage. The stocked-lake fisheries provide additional and diversified angling opportunity and reduce harvest pressure on wild fish stocks.

A sockeye salmon hatchery operated by Prince William Sound Aquaculture Corporation (PWSAC) is located in the upper Gulkana River near the community of Paxson. Egg-takes are conducted near the hatchery and overwinter rearing is accomplished at the hatchery. Fry are subsequently released at Crosswind, Paxson and Summit lakes. The returning adults are harvested in the commercial, subsistence, personal use and sport fisheries.

REGULATIONS AND REGULATORY ACTIONS

Regulations for Stocked Waters

Regulations for the Tanana and Upper Copper-Upper Susitna drainages sport fisheries are codified in Chapters 70 and 75 of Title 5 of the Alaska Administrative Code 5 AAC 70 & 5 AAC 75. Along with appropriate Statewide Regulations and other information they are summarized and simplified in a sport fishing regulation booklet for distribution to the angling public. The versions of the regulations appearing in this report have been edited and under no circumstances should they be copied from this report and used as a reference by anglers.

In 1994 the Board of Fish adopted regulations for three lakes that were intended to provide fisheries for large rainbow trout in one lake in the LTMA and two lakes in the UTMA. The regulations open fishing from 15 May through 30 September. Only unbaited, single-hook, artificial lures and flies may be used. The daily bag and possession limit for rainbow trout is one fish which must be 18 in or larger.

1999-2000 Regulatory Actions and Anticipated Future Actions

There were no regulatory actions for stocked waters in the LTMA, UTMA, or UCUSMA during this period and none are anticipated.

STATE BOARD OF FISHERIES

The two most recent meetings of the Alaska Board of Fisheries to consider regulatory issues pertaining to the AYK regulatory area and the Tanana River drainage took place in Anchorage during November 8-18, 1994 and in Fairbanks during December 2-9, 1997. During the 1994 meeting the BOF took one action specific to stocked waters. They adopted regulations designed to establish Little Harding Lake (LTMA) and Coal Mine #5 and Craig Lake (both are in the UTMA) as fisheries for large rainbow trout.

The next BOF meeting to address proposals regarding Tanana drainage sport fisheries is scheduled for January 2001, in Anchorage. Issues that will be addressed at that meeting include a reduced bag limit and a size limit for rainbow trout in Dune Lake (LTMA; Appendix A), removing trophy status (UTMA) and to delay of candidate lakes for trophy management (LTMA and UTMA). The next BOF meeting to address proposals regarding UCUSMA sport fisheries is scheduled for 2002.

Board of Fishery Actions

In 1994 Region III initiated a program to create fisheries for trophy size rainbow trout in Little Harding Lake (22 ha), Craig Lake (7 ha) and Coal Mine #5 Lake (5 ha). Special regulations were adopted by the BOF in 1997 for these lakes to increase the likelihood of creating successful fisheries. These lakes are open to fishing from 15 May through 30 September. Only unbaited, single-hook, artificial lures can be used. The daily bag and possession limit for rainbow trout is one fish which must be 18 inches (457 mm) or larger. In 2000, proposal 196 before the BOF asks to repeal special regulations on two lakes (Coal Mine #5 and Craig Lake) because the objectives of the program were not met. In proposal 214 it is recommended that one or two additional lakes (selected from Bluff Cabin Lake, Lisa Lake, Donnelly Lake, Rainbow Lake, and Monte Lake) be included in the "large fish" management category. After five years the regulation on the new lake(s) will default to the general regulations if objectives are not met.

Since 1995, the rainbow trout populations in Craig Lake and Coal Mine #5 Lake have been examined every year to evaluate progress toward providing trophy fisheries. In Craig Lake and Coal Mine #5 Lake there were fewer and smaller fish than expected. The department tried stocking larger fish in these two lakes but poor results continued. Comparison with length frequency histograms from past years show fish larger than 14 in were not present in the populations in Craig Lake and Coal Mine #5 Lake (Table 1).

The department suggests that Craig Lake and Coal Mine #5 Lake be dropped from the trophy rainbow trout program.

Recommendation

Success in establishing fisheries for trophy rainbow trout in Little Harding Lake, Craig Lake, and Coal Mine #5 Lake had criteria based on size. For these fisheries to be considered successes, at least half of an age cohort must exceed 14 inches (356 mm) by age-4. This objective was not met and the recommendation was to discontinue the program in Craig Lake and Coal Mine #5 Lake. The program will continue in Little Harding Lake where objectives are being met.

Table 1.-Number of fish stocked, abundance and size of fish in Craig and Coal Mine #5 lakes from 1994 to 2000.

Lake	Year						
	1994	1995	1996	1997	1998	1999	2000
Craig Lake^a							
Number stocked ^b	850	949	550	846	652	435	0
Abundance est.	na	na	429	179	191	na	na
Number of fish <14"	na	na	429	178	187	na	na
Number of fish >14"	na	na	0	1	4	na	na
Number of fish >18"	na	na	0	0	0	na	na
Coal Mine #5^a							
Number stocked ^b	750	450	450	856	763	333	0
Abundance est.	na	na	67	na	958	na	na
Number of fish <14"	na	na	67	na	922	na	na
Number of fish >14"	na	na	0	1	36	na	na
Number of fish >18"	na	na	0	0	0	na	na

^a Craig and Coal Mine lakes both have special management regulations to grow large fish

^b Since 1994 density of fish stocked was dropped to less than 100 per hectare to reduce competition and allow greater growth.

^c Maximum stocking of fingerling rainbow trout.

FISH AND GAME ADVISORY COMMITTEES

A total of four Advisory Committees represent resource users in the LTMA: Fairbanks, Minto/Nenana, Middle Nenana River, and Lake Minchumina. During 1999 - 2000 Region III Sport Fish Division staff attended meetings of the Fairbanks and Minto/Nenana Advisory Committees.

There are two advisory committees in the UTMA that represent resource users: Delta and Upper Tanana/Forty Mile. These two committees meet on a monthly or bi-monthly schedule throughout the fall and winter months.

Within the UCUSMA there are three advisory committees that serve resource users of the area, these are the Tok Cutoff/Nabesna Road, Copper Basin, and Paxson advisory committees. In addition, the Copper River/Prince William Sound (Cordova), Fairbanks, Delta Junction and Anchorage advisory committees often comment on proposals concerning Copper River fisheries.

SECTION II: LOWER TANANA MANAGEMENT AREA STOCKED WATERS

BACKGROUND AND HISTORICAL PERSPECTIVE

The Alaska Department of Fish and Game (ADF&G) stocks game fish in 48 to 54 lakes and one stream (Piledriver Slough) in the Lower Tanana Drainage Management Area (LTMA). Major population centers include Fairbanks, North Pole, and Nenana and two large military installations, Eielson Air Force Base and Fort Wainwright. The stocking program is designed to provide additional fishing opportunities near communities and popular recreational destinations where fish resources and angling opportunity are limited and where fishing effort and harvest are highest. Lakes in the stocking program range in size from a few acres to 2,500 acres and are accessible by road, trail, ATV or aircraft. Most of the fisheries are year round and half of the angling effort on some lakes occurs during winter. The stocking program also generates an important conservation benefit because it diverts harvest away from wild populations. The ADF&G has no conservation concern with stocked waters except in a few lakes where wild game fish such as northern pike and burbot are present. Fisheries in all stocked waters are maintained through fish stockings.

There are four major stocked fisheries in the LTMA (Birch Lake, Harding Lake, Chena Lake, and Piledriver Slough), which account for most of the angler effort and harvest. Numerous small lakes scattered through out the LTMA also receive considerable attention from anglers. In 1999, anglers fishing in the LTMA generated an estimated 115,555 angler-days of effort. About 39,935 angler-days of effort were directed toward stocked fish. The catch and harvest in stocked waters were estimated at 109,918 and 34,886 fish. In 1999, the stocking program accounted for 35% of the total effort, 39% of the total catch and 73% of the total harvest in the LTMA. The estimated total annual net economic value for just the major stocked fisheries in the LTMA was about \$2,036,198 in 1995 (Duffield, Neher, and Merrit 2001). Estimated cost of the stocking program for these waters in 1995 was \$390,998.

Water	Total annual net economic value	Standard error of total value
Chena Lake	\$397,658	\$69,497
Piledriver Slough ^a	\$464,932	\$93,299
Harding Lake	\$408,550	\$76,425
Birch Lake	\$997,524	\$141,476
Total	\$2,268,664	

^a Wild fish also are present in Piledriver Slough. Therefore, the total net economic value should be reduced by 50% to estimate angling associated with stocked fish.

Today, ADF&G provides diverse year-round sport fishing in the LTMA for rainbow trout, chinook and coho salmon, Arctic grayling, Arctic char, and lake trout. Goals of the fish stocking program in the LTMA are:

1. Reduce harvest pressure on wild stocks;
2. Provide angling opportunity for increasing numbers of anglers;
3. Diversify angling opportunity (species, location, and access); and,
4. Rehabilitate depleted wild stocks.

Meeting public demand for recreational fishing opportunities in Alaska while at the same time maintaining and protecting the wild fishery resources has become increasingly complex. Today, Alaska is experiencing increased tourism and continued forest, mineral, petroleum, and associated development. A growing avid recreation-oriented population accompanies this growing economy. Accessible sport fisheries have become crowded, new fisheries have developed, and pressure from a large mobile population is spilling ever farther a field. Stocking serves to divert angling pressure away from fragile stocks and maintain angling opportunities. Consequently, stocking has become a vital component of the statewide sport fish program.

Funding for the recreational fish stocking comes primarily from two sources. The first is the Sport Fish Account of the state Fish and Game fund, which includes revenues from sales of fishing licenses. The second and larger funding component for this program is comprised of federal funds. The Federal Aid in Sport Fisheries Restoration program, through the Dingell Johnson (D-J) Fund and the Wallop-Breaux Amendment (W-B), provides money from federal taxes on specific sporting goods, marine motor fuels, etc.

FISHERY STATISTICS FOR THE LOWER TANANA MANAGEMENT AREA, 1990-1999

From 1990 through 1999, the stocking program in the Lower Tanana Management Area generated from 27,565 to 57,762 angler-days annually (Table 2). This represents about 30% to 40% of the total annual estimated fishing effort for both stocked and wild species in the LTMA. Over the same period, annual catch of stocked fish ranged from 85,607 to 145,280 fish and annual harvest ranged from 23,228 to 52,667 fish (Table 2). These numbers represent about 26% to 46% of the total annual catch and from 46% to 73% of the total annual harvest of both wild and stocked fish in the LTMA. Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 5. More than 70% of the catch and harvest of stocked fish in the

Table 2.-Effort, harvest, and catch statistics by species for stocked fisheries in the LTMA 1990-1999.

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort											
Number of Anglers ^a		19,947	19,073	16,078	18,393	14,738	18,714	22,001	15,233	15,743	15,633
Number of Days Fished (effort)		54,087	43,895	32,834	40,690	33,113	44,344	57,762	27,565	27,934	39,935
Catch											
Rainbow trout		89,948	82,168	57,801	83,112	52,866	60,432	112,541	66,023	62,454	81,048
Coho/Chinook salmon		16,897	16,363	15,381	10,131	9,935	10,321	13,682	11,954	17,926	10,300
Arctic grayling		5,131	5,767	6,041	10,509	20,674	9,936	12,460	10,948	15,070	10,533
Arctic char		1,267	2,120	4,588	6,704	2,642	4,671	5,398	5,370	4,925	6,914
Lake trout		321	289	1,797	770	332	381	1,200	785	416	1,124
Total		113,563	106,706	85,607	111,225	86,447	85,740	145,280	95,079	100,791	109,918
Harvest											
Rainbow trout		35,313	39,872	20,136	26,085	16,853	17,427	33,492	20,543	18,906	27,812
Coho/Chinook salmon		6,566	10,550	6,793	5,678	3,628	3,288	5,094	3,696	4,865	2,568
Arctic grayling		929	1,522	700	1,657	2,665	920	617	743	1,325	1,681
Arctic char		440	494	1,311	2,608	1,068	1,382	1,697	1,665	2,298	2,505
Lake trout		102	229	363	173	73	212	246	215	51	321
Total		43,349	52,667	29,302	36,200	24,286	23,228	41,145	26,862	27,445	34,886

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

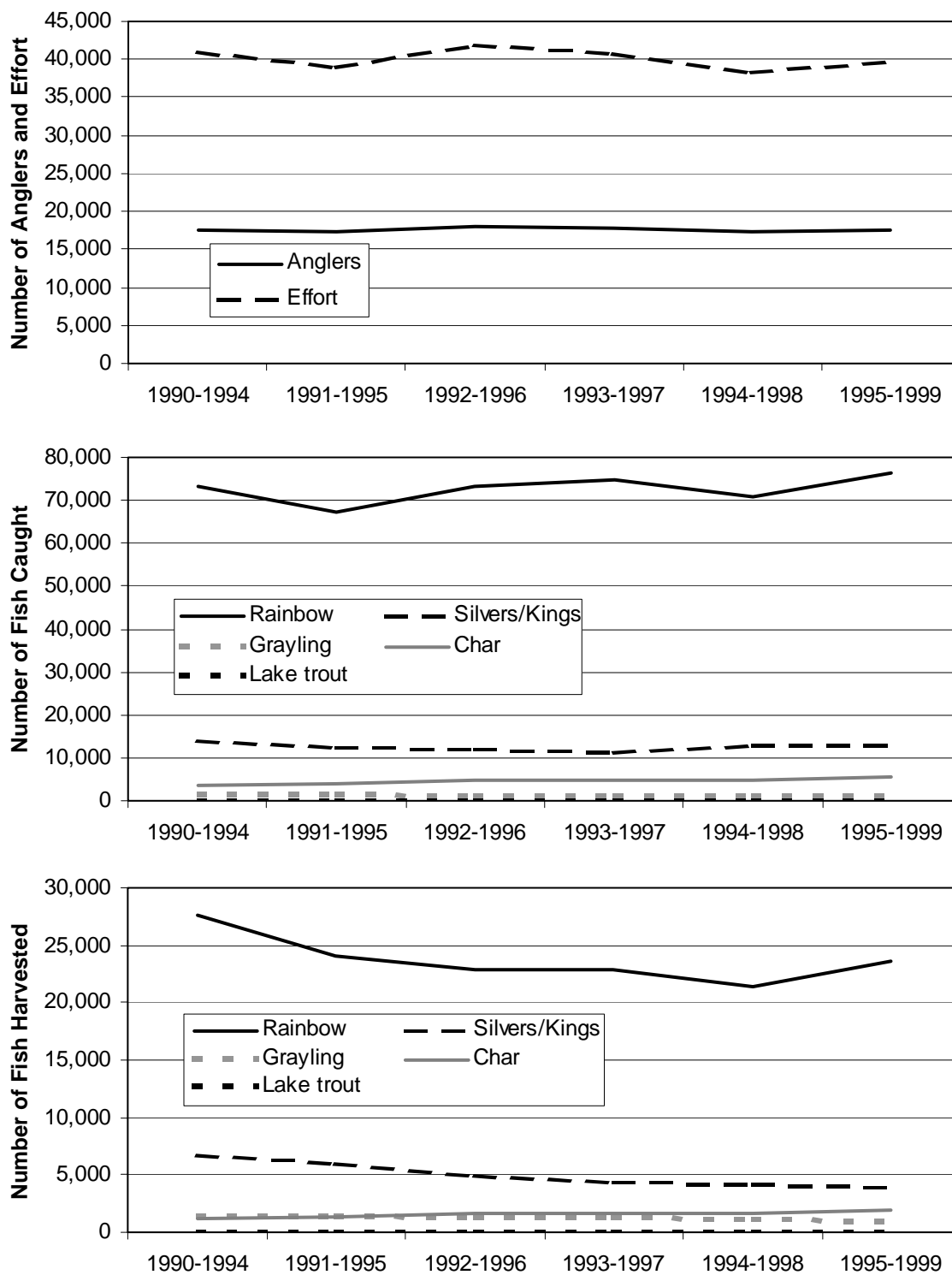


Figure 5.-Five-year averages for LTMA fisheries.

LTMA was comprised of rainbow trout. Coho and chinook salmon (landlocked silvers and kings) are next significant in numbers of fish caught and harvested followed by Arctic char, Arctic grayling, and lake trout in decreasing order (Figure 6). The average catch rate (catch / effort) for stocked fish in the LTMA is about 2.4 fish per angler-day of effort (Table 3). Since 1995, the cost of producing and stocking fish (including evaluation and support activities) has ranged from about \$242,389 to \$436,612 while the cost-per-day of fishing (cost / effort) ranged from \$5.80 to \$9.85 (Table 3). Fish stockings for 1998 through 2000 are summarized in Table 4 and projected fish stockings for 2001 and 2002 are summarized in Table 5.

ADF&G will continue to stock lakes that provide fishing opportunities and where stocked fish exhibit good survival, growth, or provide put and take fisheries. New candidate lakes will be evaluated based on public requests for new fisheries. Management plans and stocking methods for existing fisheries will be reviewed and modified to reflect changing public desire and use. Research activities will be conducted to assess public desire and use of stocked waters, evaluate progress toward achieving management objectives, and to address important fishery concerns. Objectives, actions, and evaluations for the stocking program are listed separately for each fishery management plan within the LTMA (Birch Lake, Chena Lake, Harding Lake, Piledriver Slough, Urban Small Lake, Rural Small Lakes, and Remote Small Lakes).

FISHERY MANAGEMENT PLANS AND STATISTICS

Stocked waters in the LTMA are classified into major or small fisheries. Major fisheries are lakes or streams having 5,000 or more angler-days of effort annually or 300 or more surface acres. Birch Lake, Chena Lake, Harding Lake, and Piledriver Slough are major fisheries. All other lakes are collectively called small stocked lakes and are categorized based on proximity to population centers and accessibility (urban, rural, and remote). Fishery management plans are written for each major fishery and for each category of small lakes.

Birch Lake Sport Fishery Enhancement

Birch Lake is about 55 miles south of Fairbanks along the Richardson Highway. ADF&G currently stocks Birch Lake (803 acres) with rainbow trout, landlocked silver (coho) salmon, Arctic char, and Arctic grayling. By stocking a variety of game fish species into Birch Lake, ADF&G provides a diversity that is attractive to anglers. The availability of stocked game fish in roadside lakes creates year-round fishing opportunity otherwise unavailable in Interior Alaska. Creel surveys conducted by ADF&G indicate that about half of the annual fishing effort occurs in summer during the open water period and the other half occurs through the late fall, winter, and early spring during the ice covered period. Results from angler opinion surveys of Tanana Valley residents conducted by ADF&G in 1985 and in 1988 indicated that about 80% of the respondents approved of stocking fish as a means to improve fishing.

Birch Lake and other stocked lakes absorb effort that might otherwise be directed toward wild stocks that are vulnerable to over-fishing. Increasingly restrictive regulations have been implemented to protect wild stocks in interior Alaska. As fishing and harvest pressure on these stocks have increased, the abundance (number of fish) and quality (proportion of large fish) of these fisheries declined. Stocking of hatchery fish has become an increasingly effective management option for meeting the demand for recreational fishing opportunities and protecting over fished wild stocks in the Tanana Valley. Results from ADF&G questionnaires sent to license holders in the Tanana Drainage indicated that Arctic grayling (primarily wild stocks) were

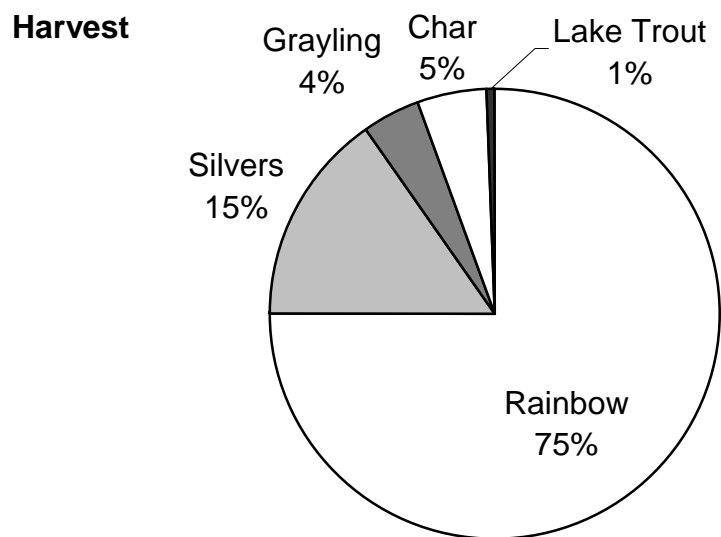
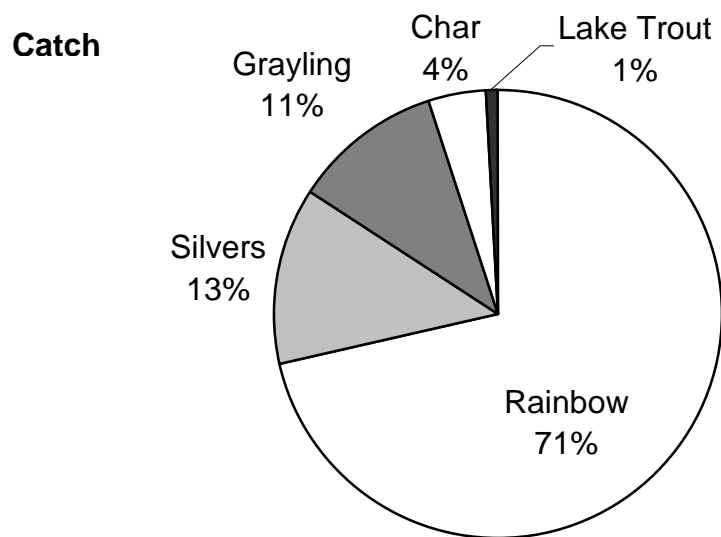


Figure 6.-Ten year average catch and harvest composition by species for all stocked waters in the LTMA, 1990-1999.

Table 3.-Summary of fishery statistics for the LTMA, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	54,087	43,895	32,834	40,690	33,113	44,344	57,762	27,565	27,934	39,935
Catch	113,563	106,706	85,607	111,225	86,447	85,740	145,280	95,079	100,791	109,918
Harvest	43,349	52,667	29,302	36,200	24,286	23,228	41,145	26,862	27,445	34,886
Catch rate (catch / effort)	2.1	2.4	2.6	2.7	2.6	1.9	2.5	3.4	3.6	2.8
Stocking cost						\$436,612	\$334,858	\$263,268	\$242,389	\$268,105
Cost-per-day of fishing						\$9.85	\$5.80	\$9.55	\$8.68	\$6.71
Cost-per-fish caught						\$5.09	\$2.30	\$2.77	\$2.40	\$2.44
Cost-per-fish harvested						\$18.80	\$8.14	\$9.80	\$8.83	\$7.69

Table 4.-Summary of stocking activities for the LTMA, 1998-2000.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
1998					
Arctic Char		6,971			6,971
Grayling		5,724			5,724
Chinook Salmon		33,114			33,114
Lake Trout		2,655			2,655
Rainbow Trout	839	68,762	4,269	23,801	97,671
Coho Salmon			34,000	35,111	69,111
Total	839	117,226	38,269	58,912	215,246
1999					
Arctic Char			58,956	6,050	65,006
Grayling		1,300			1,300
Chinook Salmon		29,742			29,742
Lake Trout		4,904			4,904
Rainbow Trout	1,055	98,398		52,906	152,359
Coho Salmon			49,772	28,000	77,772
Total	1,055	134,344	108,728	86,956	331,083
2000					
Arctic Char		2,940			2,940
Grayling		21,897		35,794	57,691
Chinook Salmon		28,728			28,728
Lake Trout		10,400			10,400
Rainbow Trout	1,226	93,649		6,009	100,884
Coho Salmon				64,125	64,125
Total	1,226	157,614		105,928	264,768

Table 5.-Summary of projected game fish stockings for the LTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
4/0	Arctic Char	Subcatchable	5-6	47,900	0
0/17	Arctic Char	Catchable	6-8	0	38,750
8/8	Chinook Salmon	Catchable	6-8	31,300	31,300
2/4	Coho Salmon	Fingerling	2-4	42,000	59,750
¾	Arctic Grayling	Fingerling	2-4	30,000	40,000
29/19	Arctic Grayling	Catchable	6-8	16,450	18,750
0/0	Lake Trout	Subcatchable	5-6	0	0
2/0	Lake Trout	Catchable	6-8	4,500	0
8/5	Rainbow Trout	Fingerling	2-4	55,750	9,000
51/48	Rainbow Trout	Catchable	6-8	80,450	67,450
14/14	Rainbow Trout	Broodstock	12-16	1,100	1,100

targeted more by anglers than were other species. Rainbow trout was the next most commonly targeted species. Surveys conducted in 1980, 1985, and again in 1988 showed that the percentage of anglers fishing specifically for rainbow trout increased for each survey; while at the same time, the percentage targeting Arctic grayling decreased.

The Birch Lake fishery is managed as a consumptive fishery, allowing anglers to harvest up to the daily bag limit of any of the stocked species. Daily bag and possession limits are:

Species	Daily Bag and Possession Limit	Size Limit
Salmon (coho/chinook)	10 in combination	no size limit
Arctic char	10	no size limit
Rainbow trout	10	no size limit
Arctic grayling	5	no size limit

Objectives

1. Provide 11,000 annual angler days or more of sport fishing effort.
2. Provide diverse sport angling opportunities through the annual or alternate year stocking of rainbow trout, coho salmon, Arctic char, and Arctic grayling.
3. Maintain an annual mean catch rate in excess of 2 sport fish per angler day while allowing anglers to keep the portion of their catch they so desire.

Actions

4. Annually stock 16,100 catchable rainbow trout.
5. Annually stock 25,000 sub-catchable coho salmon.
6. Biennially stock 14,000 sub-catchable Arctic char.
7. Annually stock 4,200 catchable Arctic grayling.

Fish stockings for 1998 through 2000 are summarized in Table 6 and projected fish stockings for 2001 and 2002 are summarized in Table 7.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Performance or status of stocking cohorts may be evaluated through on-site creel surveys and/or field sampling.

Fishery Statistics

During the period 1990-1999, annual effort ranged from 5,896 to 15,541 angler-days and averaged about 10,959 angler-days (Table 8). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 7. Over 75% of the catch and harvest is comprised of rainbow trout. Coho and chinook salmon (landlocked silvers and kings) are second in significance by numbers of fish caught and harvested followed by Arctic char, and Arctic grayling (Figure 8). Average annual effort per surface acre is about 13.7 angler-days. The average annual catch rate for the last 10 years is around 3.2 fish per angler day (Table 9). Since 1995, the cost of producing and stocking fish (stocking cost) has ranged from about \$42,612 to \$94,993 while the cost-per-day of fishing (cost / effort) ranged from \$4.54 to \$8.92 (Table 9).

Table 6.-Summary of stocking activities for Birch Lake, 1998-2000.

Species	Catchable	Subcatchable	Fingerling	Total
1998				
Coho salmon		33,219		33,219
Rainbow trout	14,907	4,237		19,144
Total	14,907	37,456		52,363
1999				
Arctic char		14,072		14,072
Coho salmon		48,972		48,972
Rainbow trout	18,830	9,580		28,410
Total	18,830	72,624		91,454
2000				
Arctic grayling	4,181			4,181
Coho salmon			42,836	42,836
Rainbow trout	16,100			16,100
Total	20,281		42,836	63,117

Table 7.-Summary of projected game fish stockings for Birch Lake, 2001-2002.

Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
Arctic Char	Subcatchable	5-6	14,000	14,000
Coho Salmon	Subcatchable	5-6	25,000	25,000
Grayling	Catchable	6-8	4,200	4,200
Rainbow Trout	Catchable	6-8	16,100	16,100

Table 8.-Effort, harvest, and catch statistics by species for Birch Lake 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers	7,528	7,341	4,849	5,825	5,270	6,090	6,152	4,331	4,772	4,709
Number of Days Fished (effort)	15,541	13,893	10,072	10,447	9,880	11,702	14,208	5,896	7,887	10,059
Catch										
Rainbow trout	34,705	35,512	19,726	29,250	22,249	24,592	36,580	18,230	22,636	26,122
Coho/Chinook salmon	7,292	9,106	8,405	6,788	6,789	4,469	6,877	4,417	10,294	5,662
Arctic grayling	0	0	0	0	0	0	0	992	1,760	463
Arctic char	0	0	0	0	0	0	1,074	959	2,015	2,568
Total	41,997	44,618	28,131	36,038	29,038	29,061	44,531	24,598	36,705	34,815
Harvest										
Rainbow trout	15,901	17,625	8,312	11,332	7,880	8,170	12,193	6,683	8,209	8,175
Coho/Chinook salmon	3,308	6,098	4,543	4,041	2,901	1,588	2,711	1,534	2,550	1,194
Arctic grayling	0	0	0	0	0	0	0	176	327	208
Arctic char	0	0	0	0	0	0	326	573	869	739
Total	19,209	23,723	12,855	15,373	10,781	9,758	15,230	8,966	11,955	10,316

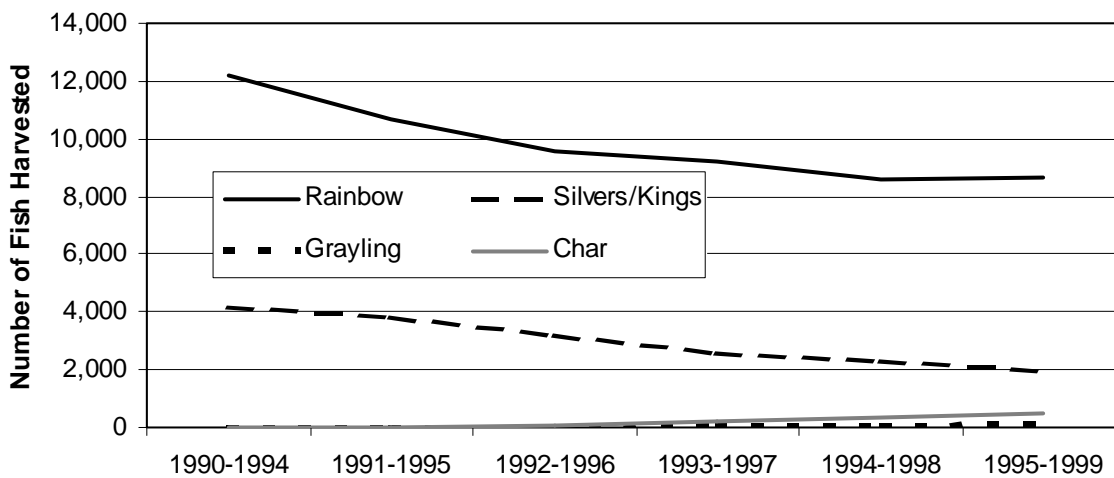
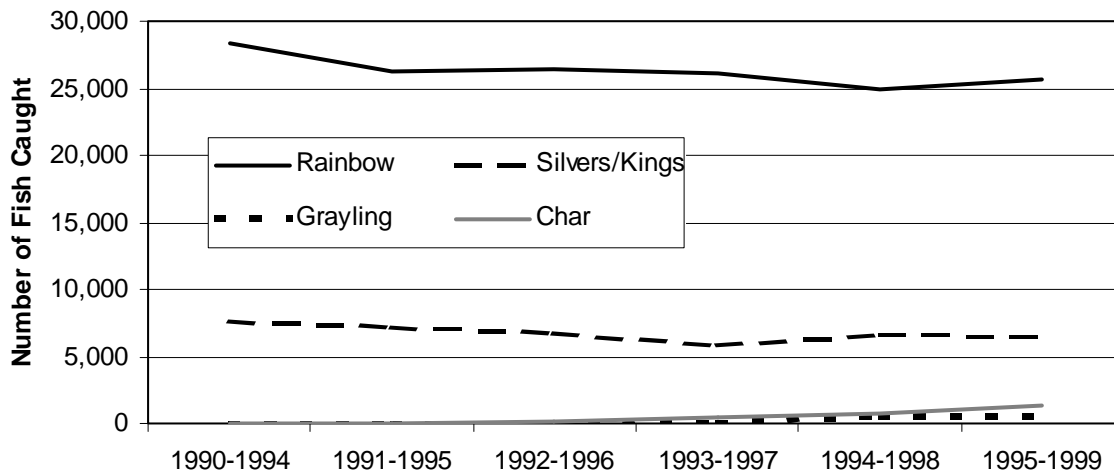
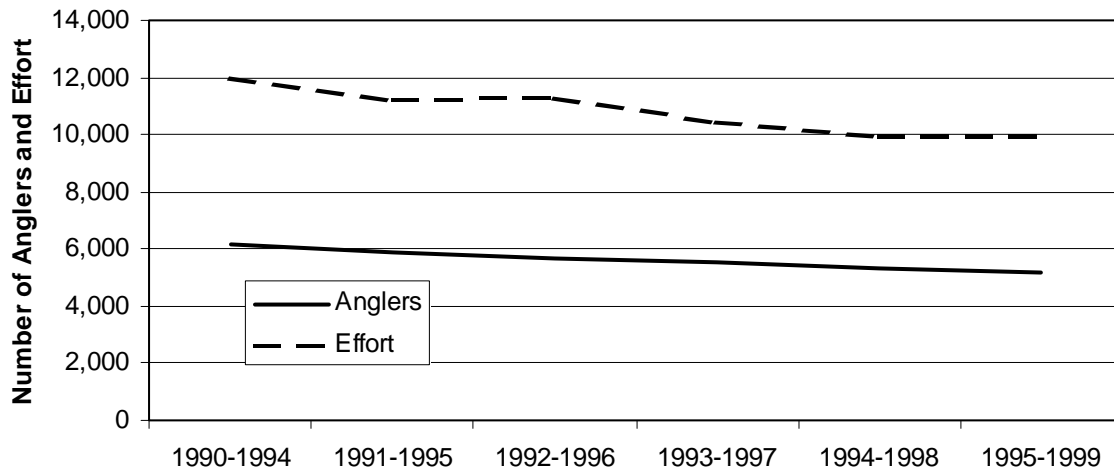


Figure 7.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from Birch Lake, 1990-1999.

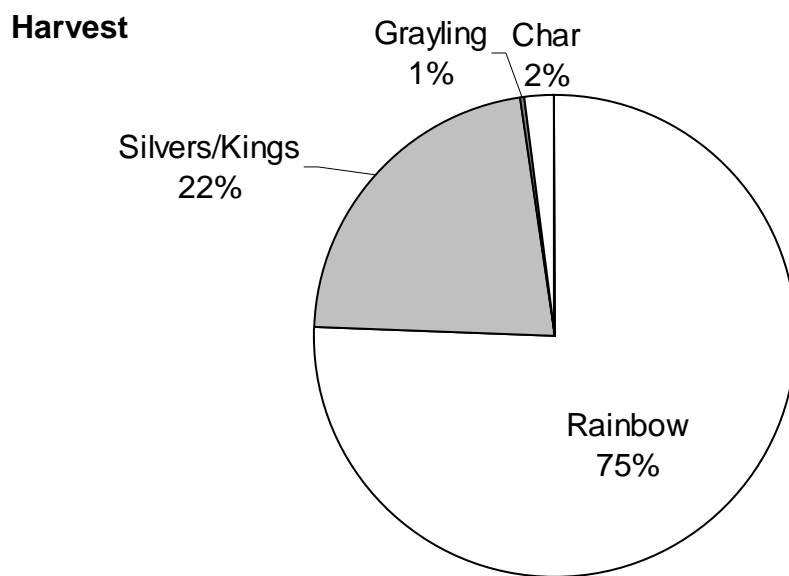
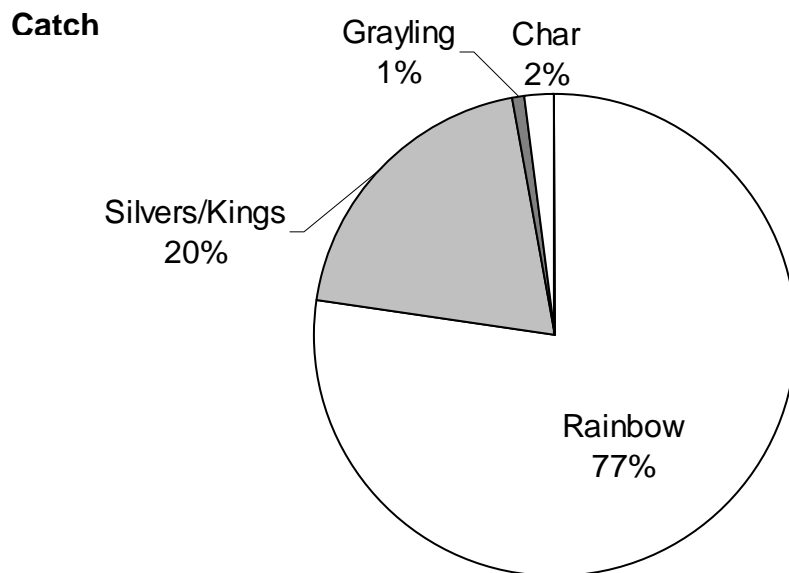


Figure 8.-Ten year average catch and harvest composition by species for Birch Lake, 1990-1999.

Table 9.-Summary of fishery statistics for the Birch Lake, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	15,541	13,893	10,072	10,447	9,880	11,702	14,208	5,896	7,887	10,059
Catch	41,997	44,618	28,131	36,038	29,038	29,061	44,531	24,598	36,705	34,815
Harvest	19,209	23,723	12,855	15,373	10,781	9,758	15,230	8,966	11,955	10,316
Catch rate (catch / effort)	2.7	3.2	2.8	3.4	2.9	2.5	3.1	4.2	4.7	3.5
Stocking cost						\$94,993	\$64,462	\$42,612	\$47,321	\$89,729
Cost-per-day of fishing						\$8.12	\$4.54	\$7.23	\$6.00	\$8.92
Cost-per-fish caught						\$3.27	\$1.45	\$1.73	\$1.29	\$2.58
Cost-per-fish harvested						\$9.73	\$4.23	\$4.75	\$3.96	\$8.70

Chena Lake Sport Fishery Enhancement

The ADF&G has been stocking Chena Lake (259 surface acres) since 1984. The lake's central location near the communities of North Pole, Eielson AFB, Ft. Wainwright, and Fairbanks and development as a park and recreational area provides the potential for major angling opportunity for Tanana Valley residents and visitors. By stocking a variety of game fish species into Chena Lake, ADF&G provides a diversity that is attractive to anglers. The availability of stocked game fish in roadside lakes creates year-round fishing opportunity otherwise unavailable in Interior Alaska. Results from angler opinion surveys of Tanana Valley residents conducted by ADF&G in 1985 and in 1988 indicated that about 80% of the respondents approved of stocking fish as a means to improve fishing.

Chena Lake and other stocked lakes absorb effort that might otherwise be directed toward wild stocks that are vulnerable to over-fishing. Increasingly restrictive regulations have been implemented to protect wild stocks in interior Alaska. As fishing and harvest pressures on these stocks have increased, the abundance (number of fish) and quality (proportion of large fish) of these fisheries declined. Stocking of hatchery fish has become an increasingly effective management option for meeting the demand for recreational fishing opportunities and protecting over fished wild stocks in the Tanana Valley. Results from ADF&G questionnaires sent to license holders in the Tanana Drainage indicated that anglers targeted Arctic grayling (primarily wild stocks) more than other species. Rainbow trout was the next most commonly targeted species. Surveys conducted in 1980, 1985, and again in 1988 showed that the percentage of anglers fishing specifically for rainbow trout increased for each survey; while at the same time, the percentage targeting Arctic grayling decreased.

The Chena Lake fishery is managed as a consumptive fishery, allowing anglers to harvest up to the daily bag limit of any of the stocked species. Daily bag and possession limits are:

Species	Daily Bag and Possession Limit	Size Limit
Chinook salmon	10 in combination	no size limit
Arctic char	10	no size limit
Rainbow trout	10	no size limit
Arctic grayling	5	no size limit

Objectives

1. Provide 6,000 annual angler days or more of sport fishing effort.
2. Provide diverse sport angling opportunities through the annual or alternate year stocking of rainbow trout, chinook salmon, Arctic char, and Arctic grayling.
3. Maintain an annual mean catch rate in excess of 2 sport fish per angler day while allowing anglers to keep the portion of their catch they so desire.

Actions

1. Annually stock 11,700 catchable rainbow trout.
2. Annually stock 20,000 catchable chinook salmon.
3. Biennially stock 14,000 sub-catchable Arctic char.
4. Annually stock 3,200 catchable Arctic grayling.

Fish stockings for 1998 and 2000 are summarized in Table 10 and projected fish stockings for 2001 and 2002 are summarized in Table 11.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Performance or status of stocking cohorts may be evaluated through on-site creel surveys and/or field sampling.

Fishery Statistics

During the period 1990 - 1999, annual effort ranged from 2,828 to 12,875 angler-days and averaged about 7,682 angler-days (Table 12). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 9. Over 73% of the catch and harvest is comprised of rainbow trout. Coho and chinook salmon (landlocked silvers and kings) are next significant in numbers of fish caught and harvested followed by Arctic char, and Arctic grayling in decreasing order (Figure 10). Average annual effort per surface acre is about 29.7 angler-days. The average annual catch rate for the last 10 years is around 2.9 fish per angler day (Table 13). The cost of producing and stocking fish (stocking cost) has ranged from about \$48,040 to \$99,709 while the cost-per-day of fishing (cost / effort) ranged from \$6.99 to \$14.79 (Table 13).

Table 10.-Summary of stocking activities for Chena Lake, 1998-2000.

Species	Broodstock	Catchable	Fingerling	Total
1998				
Rainbow trout		12,502		12,502
Coho/chinook salmon		21,644	10,367	32,011
Arctic grayling				
Arctic char		2,833		2,833
Total		36,979	10,367	
1999				
Rainbow trout	234	20,633		20,867
Coho/chinook salmon		18,970	26,000	44,970
Arctic grayling				
Arctic char			10,372	10,372
Total	234	39,603	36,372	76,209
2000				
Rainbow trout	231	12,484		12,715
Coho/chinook salmon		17,387		17,387
Arctic grayling		5,857		5,857
Arctic char				
Total	231	35,728		35,959

Table 11.-Summary of projected game fish stockings for Chena Lake, 2001-2002.

Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
Arctic Char	Catchable	6-8		5,000
Chinook Salmon	Catchable	6-8	20,000	20,000
Arctic Grayling	Catchable	6-8	3,200	3,200
Rainbow Trout	Catchable	6-8	11,700	11,700

Table 12.-Effort, harvest, and catch statistics by species for Chena Lake 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers	5,115	3,732	3,378	3,386	1,847	3,597	5,059	3,468	2,637	2,840
Number of Days Fished (effort)	12,875	9,444	6,007	6,668	2,828	9,317	11,582	6,338	4,745	7,015
Catch										
Rainbow trout	23,075	22,055	9,618	14,310	8,550	17,624	26,376	16,266	13,215	12,116
Coho/Chinook salmon	6,718	4,637	5,852	2,560	2,733	3,486	3,770	4,256	4,134	1,844
Arctic grayling	0	0	729	1,281	809	1,266	2,263	456	888	539
Arctic char	0	0	1,245	2,963	583	1,997	1,510	1,745	1,582	632
Total Fish	29,793	26,692	17,444	21,114	12,675	24,373	33,919	22,723	19,819	15,131
Harvest										
Rainbow trout	8,558	12,196	3,602	5,628	2,812	5,361	7,777	6,569	4,883	5,315
Coho/Chinook salmon	2,313	3,058	1,752	1,219	605	1,221	1,285	1,606	1,709	565
Arctic grayling	0	0	8	187	212	202	0	119	76	0
Arctic char	0	0	475	595	242	868	405	460	1,060	375
Total	10,871	15,254	5,837	7,629	3,871	7,652	9,467	8,754	7,728	6,255

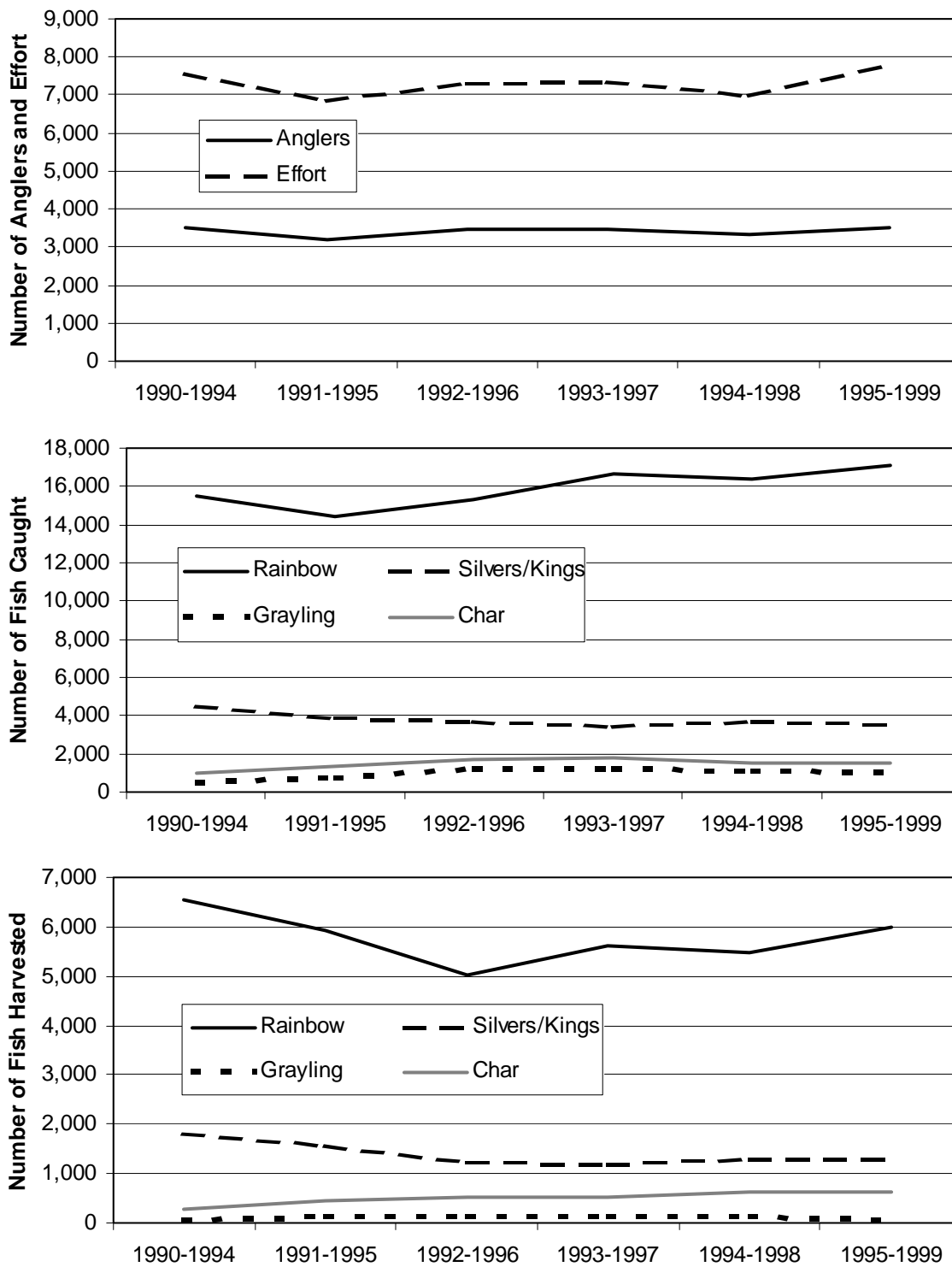


Figure 9.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from Chena Lake, 1990-1999.

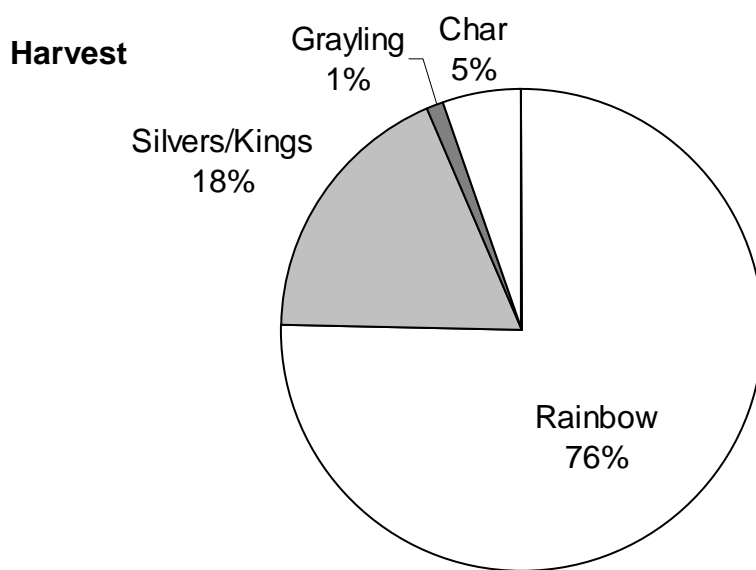
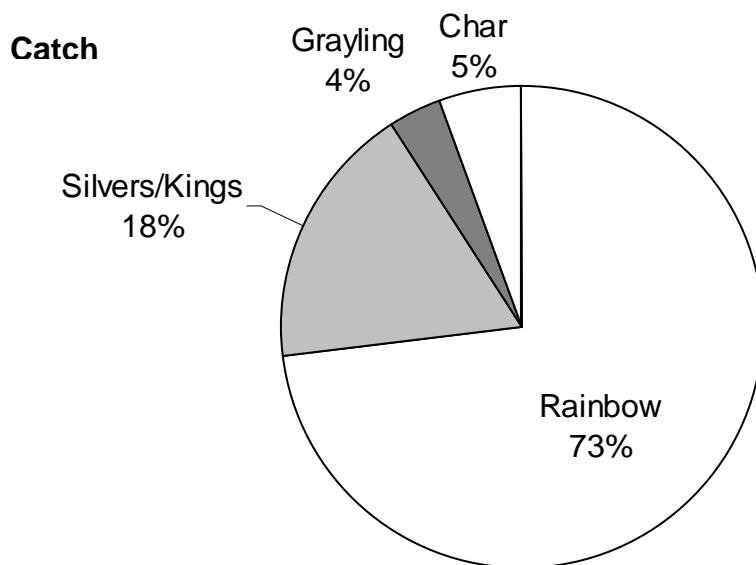


Figure 10.-Ten year average catch and harvest composition by species for Chena Lake, 1990-1999.

Table 13.-Summary of fishery statistics for the Chena Lake, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	12,875	9,444	6,007	6,668	2,828	9,317	11,582	6,338	4,745	7,015
Catch	29,793	26,692	17,444	21,114	12,675	24,373	33,919	22,723	19,819	15,131
Harvest	10,871	15,254	5,837	7,629	3,871	7,652	9,467	8,754	7,728	6,255
Catch rate (catch / effort)	2.3	2.8	2.9	3.2	4.5	2.6	2.9	3.6	4.2	2.2
Stocking cost						\$99,709	\$80,910	\$48,040	\$70,194	\$72,596
Cost-per-day of fishing						\$10.70	\$6.99	\$7.58	\$14.79	\$10.35
Cost-per-fish caught						\$4.09	\$2.39	\$2.11	\$3.54	\$4.80
Cost-per-fish harvested						\$13.03	\$8.55	\$5.49	\$9.08	\$11.61

Harding Lake Sport Fishery Enhancement

Harding Lake is about 45 miles south of Fairbanks along the Richardson Highway. ADF&G currently stocks Harding Lake (2,500 acres) with Arctic char and lake trout. Although these fish are not numerous, both species attain large size in Harding Lake, which makes them attractive to anglers. The availability of stocked game fish in roadside lakes creates year-round fishing opportunity otherwise unavailable in Interior Alaska. Creel surveys conducted by ADF&G indicate that about half of the annual fishing effort occurs in summer during the open water period and the other half occurs through the late fall, winter, and early spring during the ice covered period. Results from angler opinion surveys of Tanana Valley residents conducted by ADF&G in 1985 and in 1988 indicated that about 80% of the respondents approved of stocking fish as a means to improve fishing.

Harding Lake and other stocked lakes absorb effort that might otherwise be directed toward wild stocks that are vulnerable to over-fishing. Increasingly restrictive regulations have been implemented to protect wild stocks in interior Alaska. As fishing and harvest pressure on these stocks have increased, the abundance (number of fish) and quality (proportion of large fish) of these fisheries declined. Stocking of hatchery fish has become an increasingly effective management option for meeting the demand for recreational fishing opportunities and protecting over fished wild stocks in the Tanana Valley. Results from ADF&G questionnaires sent to license holders in the Tanana Drainage indicated anglers targeted Arctic grayling (primarily wild stocks) more than other species. Rainbow trout was the next most commonly targeted species. Surveys conducted in 1980, 1985, and again in 1988 showed that the percentage of anglers fishing specifically for rainbow trout increased for each survey; while at the same time, the percentage of anglers targeting Arctic grayling decreased.

Harding Lake has wild populations of northern pike, burbot, and least cisco. Lake trout were transplanted into Harding Lake from other lakes in the interior in the 1930's and again in the 1960's. These fish are now a self-sustaining population. ADF&G has also stocked lake trout in Harding Lake from two ADF&G hatcheries during the 1990's. Lake trout are no longer stocked into Harding Lake and they are no longer produced by the hatcheries.

Because self-sustaining populations of game fish are present there must be adequate conservation measures to maintain these populations while at the same time providing opportunity to catch stocked lake trout and Arctic char. Because the lake trout population is self-sustaining, it requires conservation measures similar to those for northern pike and burbot. The fishery is managed to protect self-sustaining populations while allowing liberal harvest of Arctic char. Daily bag and possession limits are:

Species	Daily Bag and Possession Limit	Size Limit
Northern pike	Closed (catch-and-release not allowed)	
Burbot	2	no size limit
Lake trout	1	26" or larger
Arctic char	10	no size limit

Set lines may not be used in Harding Lake.

Objectives

1. Manage indigenous stocks of northern pike and burbot at sustainable levels.
2. Manage the non-indigenous but reproducing stock of lake trout at sustainable levels, and begin stocking catchable lake trout (*see* Note).

Note: Lake trout production at ADF&G hatcheries has been canceled. Hatchery operation was changed in order to comply with ADF&G policies for disease control and the elimination of heated water at Ft. Richardson hatchery. Canceling lake trout production was the most effective way to operate the hatchery and stocking program given current constraints. ADF&G may resume lake trout production when the situation at the hatcheries improves.

3. Provide increased diversity of recreational angling opportunity through the annual stocking of Arctic char.

Actions

1. Biennially stock 30,000 sub-catchable Arctic char.
2. Biennially stock catchable lake trout (*see* Note).

Fish stockings for 1998 through 2000 are summarized in Table 14 and projected fish stockings for 2001 and 2002 are summarized in Table 15.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Status of introduced species may be monitored during research activity on wild stocks or when current information is required on stocked species.

Fishery Statistics

During the period 1990-1999, annual effort on both wild and stocked species ranged from 2,998 to 6,743 angler-days and averaged about 4,718 angler-days. About one-half of the total number of anglers and annual effort was attributed to stocked species (Table 16). Five-year moving averages for number of anglers, effort, catch and harvest attributed to stocked fish are shown in Figure 11. About 78% of the catch and harvest of stocked fish is comprised of Arctic char. Lake trout make up the rest of the catch and harvest. Average annual effort per surface acre is about 1 angler-day. The average annual catch rate for the last 10 years is around 1 fish per angler day (Table 17). Since 1995, the cost of producing and stocking fish (stocking cost) has ranged from \$0 to about \$40,240 while the cost-per-day of fishing (cost / effort) ranged from \$0.19 to \$11.93 (excluding data for 1998 when no fish were stocked into Harding Lake, Table 17).

Table 14.-Summary of stocking activities for Harding Lake, 1998-2000.

Species	Catchable	Subcatchable	Fingerling	Total
1998				
Arctic char				
Lake trout				
Total				
1999				
Arctic char		29,895		29,895
Lake trout	3,807			3,807
Total	3,807	29,895		33,702
2000				
Arctic char				
Lake trout	4,021			4,021
Total	4,021			4,021

Table 15.-Summary of projected game fish stockings for Harding Lake, 2001-2002.

Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
Arctic char	Subcatchable	5-6	30,000	0
Lake trout	Catchable	6-8	4,000	0

Table 16.-Effort, harvest, and catch statistics by species for Harding Lake 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	1,325	1,621	1,415	1,508	1,191	1,751	1,580	1,086	1,185	822
Number of Days Fished (effort) ^a	1,948	2,578	2,534	2,443	2,457	3,372	3,367	1,692	1,705	1,499
Catch										
Rainbow trout	1,182	277	3,253	417	676	0	0	0	0	0
Arctic grayling	84	147	16	654	48	0	0	0	0	0
Arctic char	996	2,076	1,401	195	108	1,610	1,801	1,375	865	2,694
Lake trout	186	148	517	438	280	258	556	462	311	814
Total	2,448	2,648	5,187	1,704	1,112	1,868	2,357	1,837	1,176	3,508
Harvest										
Rainbow trout	354	246	1,385	245	80	0	0	0	0	0
Arctic grayling	17	86	8	233	0	0	0	0	0	0
Arctic char	304	450	508	107	72	245	405	257	331	687
Lake trout	51	133	200	132	66	177	121	90	44	90
Total	726	915	2,101	717	218	422	526	347	375	777

^a The number of anglers and angler effort reported in these tables are one-half of what was estimated in the Statewide Harvest Survey.

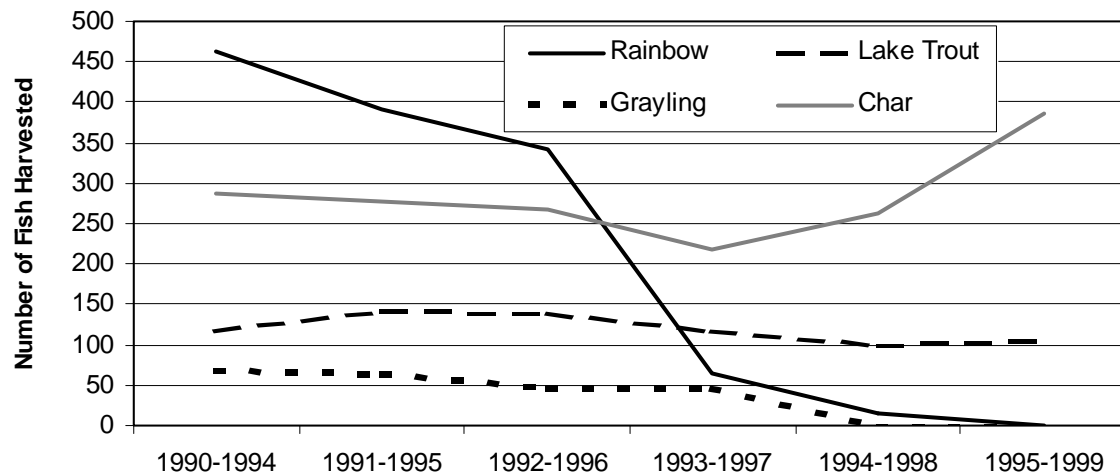
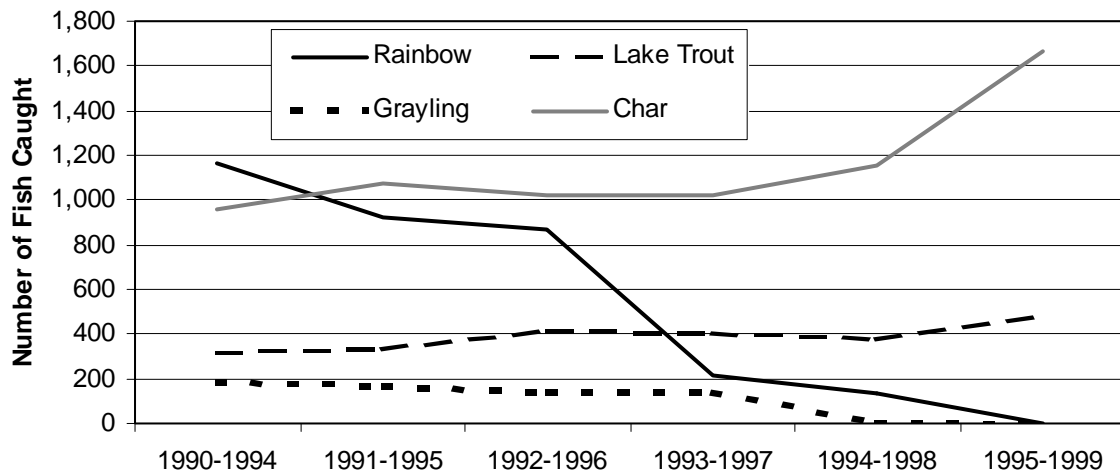
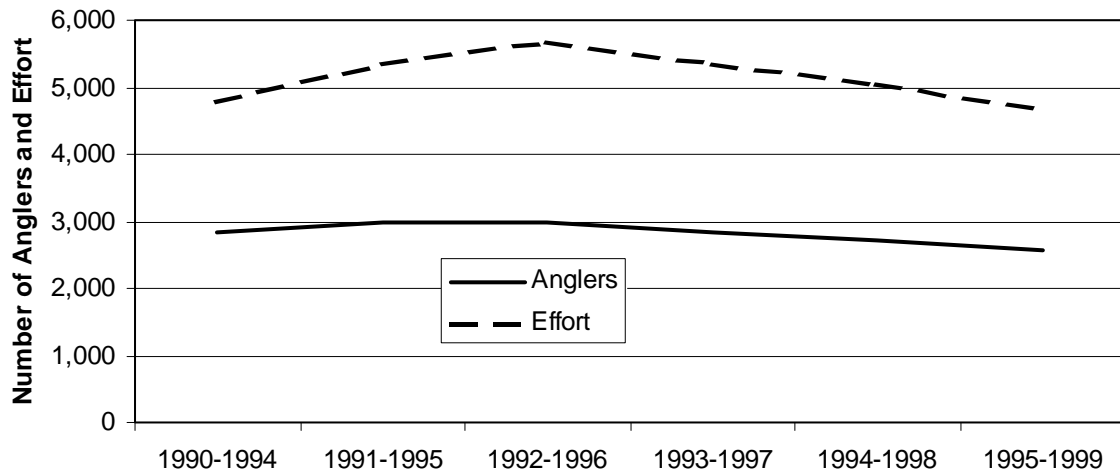


Figure 11.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from Harding Lake, 1990-1999.

Table 17.-Summary of fishery statistics for the Harding Lake, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	1,948	2,578	2,534	2,443	2,457	3,372	3,367	1,692	1,705	1,499
Catch	2,355	2,574	4,929	1,485	972	1,739	2,079	1,606	1,021	3,101
Harvest	701	849	2,001	651	185	334	466	302	353	732
Catch rate (catch / effort)	1.2	1.0	1.9	0.6	0.4	0.5	0.6	0.9	0.6	2.1
Stocking cost						\$40,240	\$642	\$602	\$0	\$13,466
Cost-per-day of fishing						\$11.93	\$0.19	\$0.36	\$0	\$8.98
Cost-per-fish caught						\$23.14	\$0.31	\$0.37	\$0	\$4.34
Cost-per-fish harvested						\$120.48	\$1.38	\$1.99	\$0	\$18.40

PILEDRIVER SLOUGH SPORT FISHERY ENHANCEMENT

Piledriver Slough is a clear water stream about 30 miles south of Fairbanks along the Richardson Highway. The recreational fishery at Piledriver Slough has undergone a number of changes since 1976 when the upstream portion of the slough was blocked to control flooding from the Tanana River. ADF&G stocked rainbow trout into Piledriver Slough in spring 1987 with the objectives of diversifying local sport fishing opportunities and diverting a portion of the increasing recreational fishing pressure away from various wild stocks in the area.

Arctic grayling use Piledriver Slough for spawning and rearing. ADF&G has documented the presence of white fish (sp), burbot, northern pike, sheefish, and adult chum, coho, and chinook salmon but has not documented their use of the slough for spawning or rearing by juveniles.

Annual grayling harvest increased from 2,312 in 1986 to a high of 8,095 in 1988. Harvest then declined as a size limit was put on the fishery. In 1993, an emergency order was implemented restricting Arctic grayling fishing to catch and release. In 1999, 18,555 Arctic grayling were caught. Harvest of Arctic grayling will be closed for the foreseeable future.

Current sport fishing regulations for Piledriver Slough are designed to protect and maintain the Arctic grayling stock while allowing for recreational use. Because rainbow trout are stocked, ADF&G does not have the same conservation concern as for wild stocks. The high bag and possession limit for rainbow trout serves to draw fishing pressure away from wild stocks in other locations where conservation concerns exist. Daily bag and possession limits are:

Species	Daily Bag and Possession Limit	Size Limit
Arctic grayling	Only catch-and-release allowed	
Rainbow trout	10	no size limit

Objectives

1. Ensure that incidental mortality of Arctic grayling and that harvest and incidental mortality of other naturally occurring species is sustainable. Fishing mortality on the Arctic grayling population should not exceed 20% annually.
2. Provide 10,000 or more days of recreational fishing annually on a streamside rainbow trout fishery.
3. Maintain an annual mean catch rate in excess of two fish per angler day while allowing anglers to retain the portion of the catch of rainbow trout they so desire.

Actions

1. Since the fishing mortality of Arctic grayling (estimated at 5% of those released) is less than 20% of the population (about 8,700 in 1997), and the fishing mortality of other species is sustainable, the stocking strategy need not be modified to reduce incidental mortality.
2. Annually stock 20,000 all-female catchable rainbow trout in three equal increments. The first stocking will be in early spring, followed by two in early summer.
3. Annually stock 500 to 1,000 surplus all-female broodstock rainbow trout.

Fish stockings for 1998 and 1999 are summarized in Table 18 and projected fish stockings for 2000 and 2001 are summarized in Table 19.

Evaluations

Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.

Fishery Statistics

After the introduction of rainbow trout, angling effort increased dramatically from 2,079 angler-days in 1986 to a high of 27,705 angler-days in 1990. Since 1990, effort has generally declined each year. Average effort during the period 1990-1999 was about 13,191 angler-days. About one-half of the total number of anglers and annual effort was attributed to stocked rainbow trout (Table 20). The number of anglers and annual effort reported in these tables and figures are one-half of what was estimated in the Statewide Harvest Survey. Five-year moving averages for numbers of anglers, effort, catch and harvest are shown in Figure 12. Over the last 10 years, rainbow trout comprised 41% of the catch (Table 20). The average annual catch rate (catch / effort) for rainbow trout over the last 10 years is 2.3 fish per angler-day (Table 21). Since 1995 the cost of producing and stocking fish (stocking cost) has ranged from \$35,648 to \$50,838 while the cost-per-day of fishing (cost / effort) ranged from \$7.61 to \$13.91 (Table 21).

Table 18.-Summary of stocking activities for Piledriver Slough, 1998-2000.

Species	Broodstock	Catchable	Fingerling	Total
1998				
Rainbow trout	500	13,938		14,438
1999				
Rainbow trout	403	19,953		20,356
2000				
Rainbow trout	415	21,710		22,125

Table 19.-Summary of projected game fish stockings for Piledriver Slough, 2001-2002.

Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
Rainbow trout	Broodstock	12-18	500	500
Rainbow trout	Catchable	6-8	10,000	10,000

Table 20.-Effort, harvest, and catch statistics by species for Piledriver Slough 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	3,157	2,619	2,450	2,356	1,542	1,736	1,912	1,125	1,018	1,163
Number of Days Fished (effort) ^a	13,853	8,798	6,791	8,572	5,685	6,256	5,868	3,396	2,563	4,175
Catch										
Rainbow trout	23,818	18,072	18,388	23,278	8,267	6,588	19,280	13,474	5,649	7,907
Arctic grayling ^b	34,840	30,012	15,252	32,036	31,324	17,431	16,667	24,583	24,203	18,555
Total	58,658	48,084	33,640	55,314	39,591	24,019	35,947	38,057	29,852	26,462
Harvest										
Rainbow trout	8,052	6,352	5,454	5,987	2,673	1,199	3,624	2,078	1,237	1,666
Arctic grayling ^b	2,380	3,987	1,030	759	57	0	0	0	0	0
Total	10,432	10,339	6,484	6,746	2,730	1,199	3,624	2,078	1,237	1,666

^a The number of anglers and angler effort reported in these tables are one-half of what was estimated in the Statewide Harvest Survey.

^b The Piledriver Slough Arctic grayling is a wild stock.

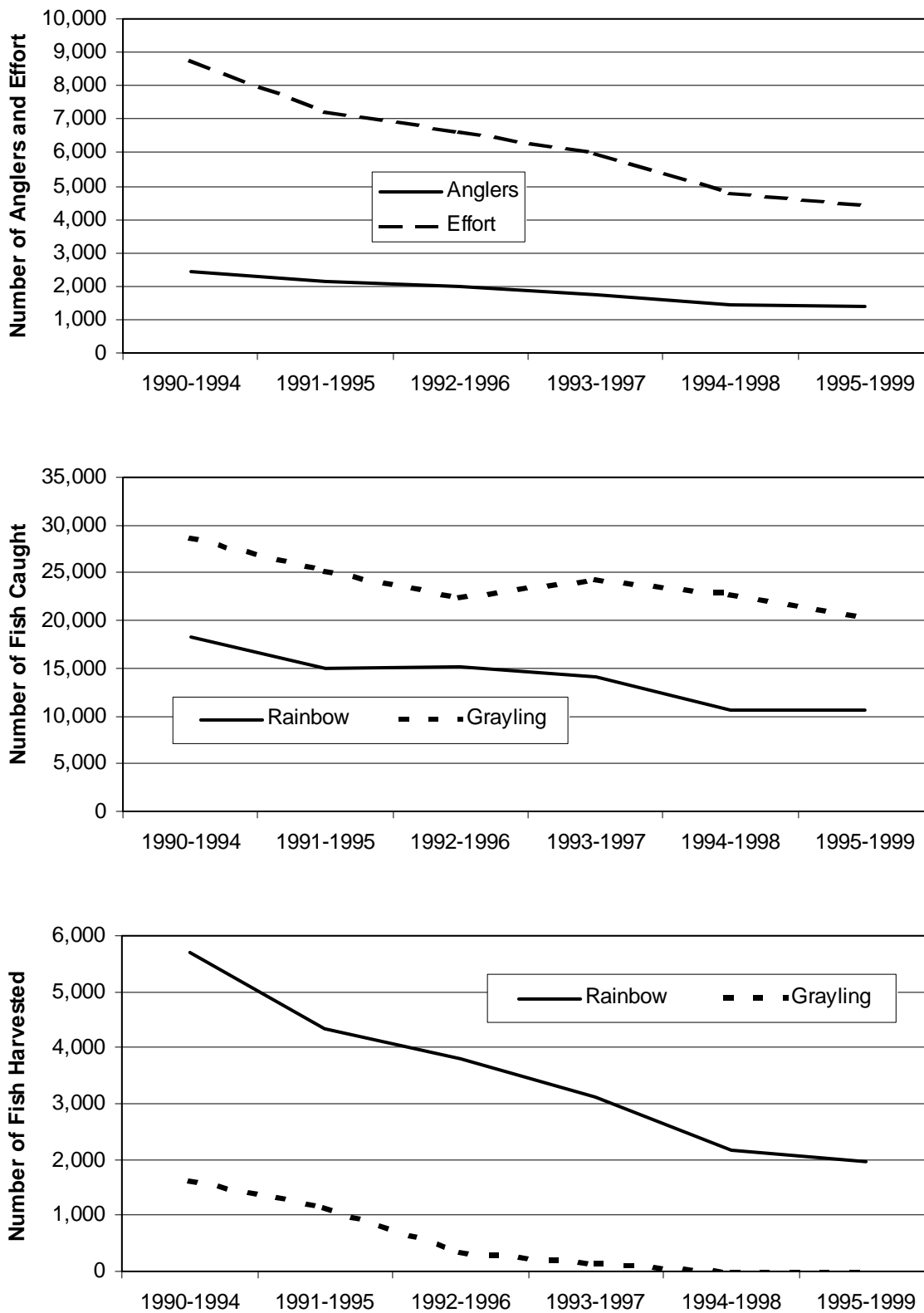


Figure 12.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from Piledriver Slough, 1990-1998.

Table 21.-Summary of fishery statistics for the Piledriver Slough, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	13,853	8,798	6,791	8,572	5,685	6,256	5,868	3,396	2,563	4,175
Catch	23,818	18,072	18,388	23,278	8,267	6,588	19,280	13,474	5,649	7,907
Harvest	8,052	6,352	5,454	5,987	2,673	1,199	3,624	2,078	1,237	1,666
Catch rate (catch / effort)	1.7	2.1	2.7	2.7	1.5	1.1	3.3	4.0	2.2	1.9
Stocking cost						\$50,838	\$44,629	\$37,508	\$35,648	\$47,098
Cost-per-day of fishing						\$8.13	\$7.61	\$11.04	\$13.91	\$11.28
Cost-per-fish caught						\$7.72	\$2.31	\$2.78	\$6.31	\$5.96
Cost-per-fish harvested						\$42.40	\$12.31	\$18.05	\$28.82	\$28.27

Lower Tanana Valley Urban Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game has recently directed increased effort toward stocking small lakes in or near Fairbanks, Nenana, North Pole, and Eielson Air Force Base. These urban lakes are close to population centers and are easily accessible by a large number of anglers. The potential fishing effort per surface acre for these lakes may be greater than that for the more distant but larger rural lakes such as Harding Lake, Birch Lake and Lost Lake. These lakes serve a segment of the public who may desire to remain near home or who are unable to travel to more distant locations to fish.

The urban lakes stocking program is intended to provide fishing opportunities and diversify fishing experiences available to anglers in and near population centers. Most of these lakes are less than 100 surface acres and can not produce sufficient numbers of catchable size fish from stockings of fingerlings to meet angler demand. The ADF&G generally stocks catchable fish (6-15 inches) in the urban lakes two or three times a year. Stocking begins as soon as the ice is gone, helping to accommodate angler enthusiasm for spring fishing.

This program has created seasonal and year-round fishing opportunities in waters that do not normally support popular game fish. Recently the department has started stocking catchable rainbow trout in lakes that don't usually support fish through winter. Some of these lakes are shallow (< 6 ft deep) and freeze to the bottom. Other lakes are deeper and don't freeze to the bottom; but when ice-covered they often have dissolved oxygen levels too low (< 1 ppm) to sustain fish. Ballaine Lake in Fairbanks and Little Lost Lake near Quartz Lake are two examples. In the past, when the department stocked only fingerlings, the fish did not survive the first winter and did not attain catchable size. Because these lakes don't support fish year round they are considered "marginal". Yet, by stocking these marginal lakes with catchable size fish the department has created instant and popular fisheries. ADF&G tries to stock only enough fish to support the spring and summer fishing season. Any fish left in the lake may not survive the winter. These recent changes to the stocking program have increased the number of lakes that the department can stock and have increased angler opportunity and species diversity.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
Salmon (king and silver)	10 in combination	No size limit
Rainbow trout	10	No size limit
Arctic grayling	5	No size limit
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 8,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 22. Fish stockings for 1999 and 2000 are summarized in Table 23 and projected fish stockings for 2001 and 2002 are summarized in Table 24.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 2,203 to 12,645 angler-days and averaged about 4,757 angler-days (Table 25). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 13. Since 1990, 57% of the catch and 71% of the harvest of stocked game fish were rainbow trout. Arctic grayling were next in significance by numbers of fish caught and harvested followed by Arctic char, coho and chinook salmon (landlocked silvers and kings), and lake trout in decreasing order (Figure 14). Average annual effort per surface acre for stocked species is about 19.7 angler-days. The average catch rate (catch / effort) for stocked fish in rural lakes in the LTMA is about 1.9 fish per angler-day of effort (Table 26). The annual cost of producing and stocking fish (stocking cost) has ranged from about \$25,562 to \$78,545 while the annual cost-per-day of fishing (cost / effort) ranged from \$3.55 to \$26.89 (Table 26).

Lower Tanana Valley Rural Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game has been stocking small rural lakes in the Lower Tanana Valley for more than 20 years. These lakes are along or near the road system and are easily accessed directly by road while access to some may require a short hike or ATV. The rural small lakes stocking program will serve a segment of the public who want to get away from population centers but must remain on the road system. This program provides increased fishing opportunities and offers a diversity of species in rural areas where minimal or no opportunities exist for sport fishing. It also diverts effort from wild populations in areas for which the department has production concerns.

The rural small lakes stocking program is intended to provide fishing opportunities and diversify the sport species and fishing experiences available to anglers. This program has created seasonal and year-round fishing opportunities in waters that do not normally support popular game fish. Most of the rural lakes in the LTMA area are less than 100 surface acres and receive a lot of fishing pressure relative to their size. As a result, they can't produce sufficient numbers of catchable fish (from stockings of fingerlings) to meet angler demand. The Department of Fish and Game generally stocks catchable fish (6-12 inches) in the rural ponds once a year. Most lakes are stocked with rainbow trout and Arctic grayling. To reduce costs the department generally stocks rainbow trout and Arctic grayling on alternate years. For example, in one year only rainbow trout are stocked in the ponds along the Steese and Chena Hot Springs roads. The next year the department stocks Arctic grayling. This strategy reduces by half the number of transport trips the hatchery needs to make to maintain these fisheries. Some of the more popular fisheries are stocked early in spring and again during summer to provide sufficient numbers of

Table 22.-Actions for small urban stocked lakes in the LTMA.

Lake	Lake Size (Acres)	Species	Stocking Years
Fairbanks			
Ballaine Lake	2	Rainbow	Annual
Hansen Road Pond	10	Rainbow	Even Years
Lundgren Pond	3	Rainbow	Annual
Monterey Lake	5	Rainbow, Chinook	Annual
Outboard Pit	70	Char, Rainbow, Chinook	Even Years, Annual, Annual
Wainwright #6	3	Grayling	Annual
Weigh Station Pond # 1	2	Rainbow, Grayling, Chinook	Annual, Annual, Annual
Weigh Station Pond # 2	2	Rainbow, Grayling, Chinook	Annual, Annual, Annual
North Pole			
Bathing Beauty Pond	7	Char, Rainbow, Grayling, Chinook	Odd Years, Annual, Annual, Annual
North Pole Pond	14	Rainbow, Grayling, Chinook	Annual
North Project Pond	5	Rainbow	Annual
Sirlin Drive Pond	2	Rainbow	Annual
Z Pit	5	Grayling	Annual
Eielson AFB			
Grayling Lake	22	Char, Rainbow, Grayling	Even Years, Annual, Annual
Hidden Lake	18	Char, Rainbow, Grayling	Even Years, Annual, Annual
Moose Lake	23	Char, Lake Trout, Rainbow, Grayling	Even Years, Annual, Annual, Annual
Polaris Lake	44	Char, Rainbow, Chinook	Even Years, Annual, Annual
Nenana			
Nenana City Pond	9	Rainbow	Annual

Table 23.-Summary of game fish stocking activities for small urban lakes in the LTMA, 1999-2000.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
1999					
Arctic char			3,273	2,500	5,773
Arctic grayling		400			400
Chinook salmon		10,772			10,772
Lake trout		597			597
Rainbow trout	326	18,337			18,663
Total	326	30,106	3,273	2,500	36,205
2000					
Arctic char		3,640			3,640
Arctic grayling		10,309		25,000	35,309
Chinook salmon		11,341			11,341
Lake trout		400			400
Rainbow trout	403	29,377			29,780
Total	403	55,067		25,000	80,470

Table 24.-Summary of projected game fish stockings for small urban lakes in the LTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
1/0	Arctic char	Subcatchable	5-6	700	0
0/6	Arctic char	Catchable	6-8	0	4,750
7/7	Chinook salmon	Catchable	6-8	11,300	11,300
1/1	Coho salmon	Fingerling	3-5	2,000	2,000
1/1	Coho salmon	Subcatchable	5-6	400	400
11/11	Grayling	Catchable	6-8	7,550	7,550
1/0	Lake trout	Catchable	6-8	400	0
0/1	Rainbow trout	Fingerling	2-4	0	2,000
15/15	Rainbow trout	Catchable	6-8	18,203	18,203
10/10	Rainbow trout	Broodstock	12-16	425	425

Table 25.-Effort, harvest, and catch statistics by species for small urban lakes in the LTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	890	559	777	1,361	979	1,186	3,363	1,132	1,385	1,857
Number of Days Fished (effort)	4,925	3,007	2,203	3,717	3,497	4,584	12,645	2,915	2,875	7,202
Catch										
Rainbow trout	1,287	299	2,027	2,827	2,119	2,008	15,753	3,854	5,725	13,678
Coho/Chinook salmon	68	84	0	116	86	35	182	756	1,191	1,310
Arctic grayling	2,144	869	1,194	1,965	5,151	4,275	5,540	1,437	2,637	1,099
Arctic char	196	29	1,622	1,755	716	463	821	445	133	468
Lake trout	115	66	259	16	6	14	83	200	56	73
Total	3,809	1,346	5,102	6,680	8,078	6,795	22,378	6,691	9,742	16,628
Harvest										
Rainbow trout	249	286	667	438	379	730	5,347	1,669	1,304	3,846
Coho/Chinook salmon	0	67	0	34	22	0	161	56	60	349
Arctic grayling	344	98	226	370	280	170	251	165	504	91
Arctic char	61	29	217	847	107	57	517	175	2	351
Lake trout	41	39	80	0	0	14	18	54	0	68
Total	695	519	1,190	1,689	787	971	6,294	2,118	1,870	4,706

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

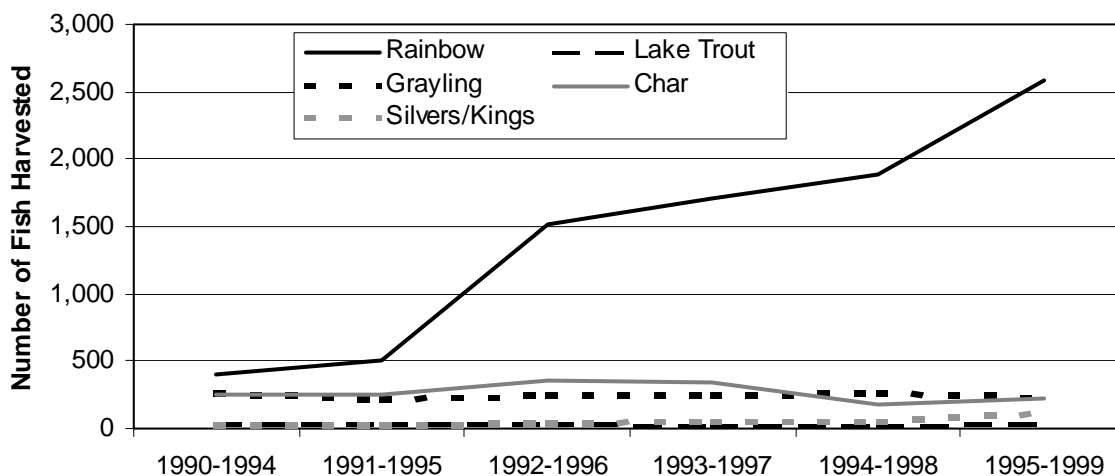
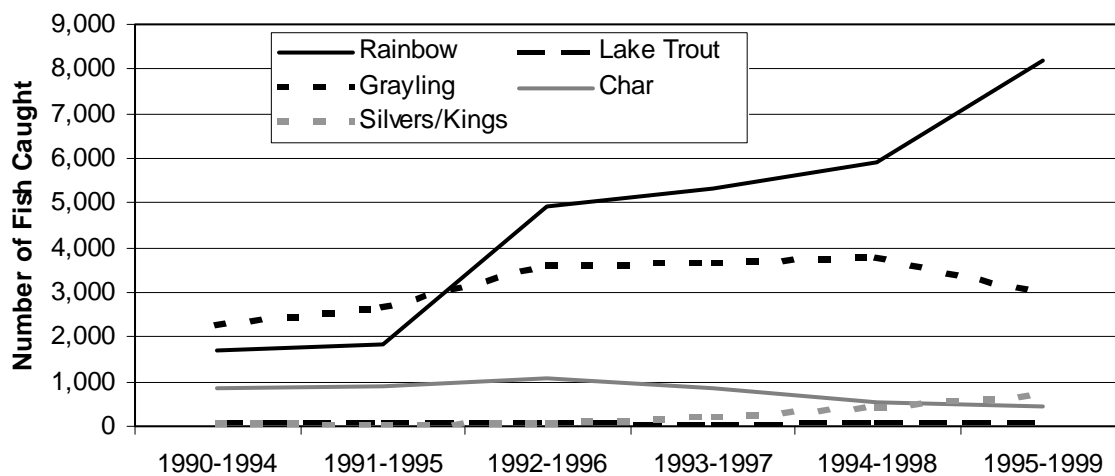
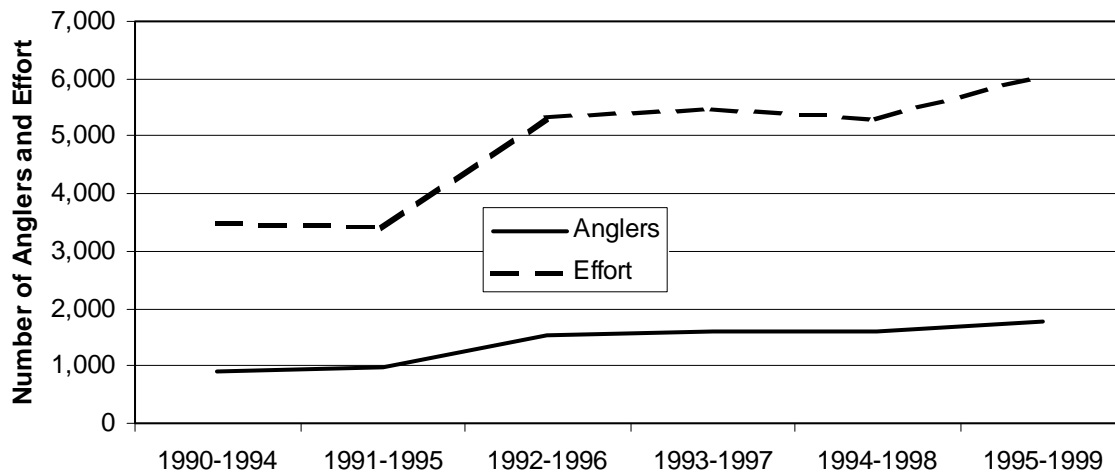


Figure 13.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from LTMA small urban lakes, 1990-1999.

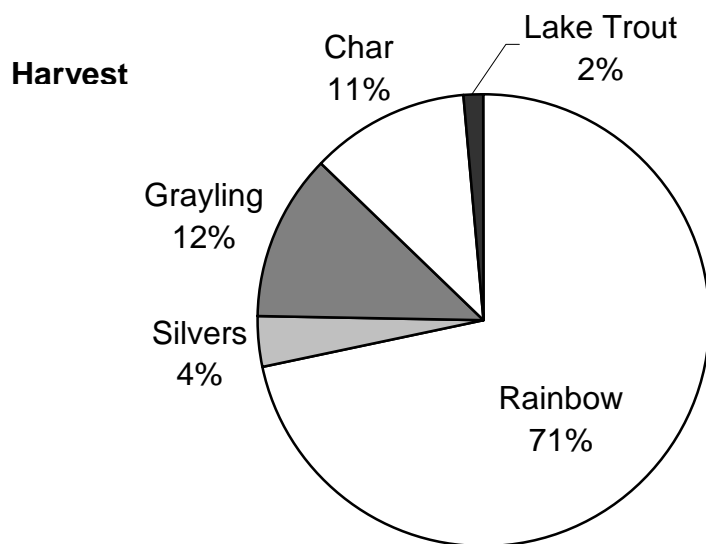
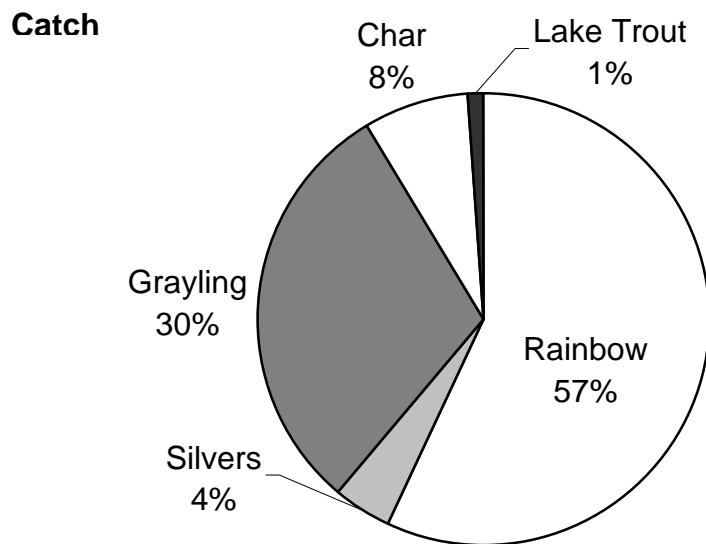


Figure 14.-Ten year average catch and harvest composition by species for small urban lakes in the LTMA, 1990-1999.

Table 26.-Fishery statistics for LTMA small urban lakes, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished	4,925	3,007	2,203	3,717	3,497	4,584	12,645	2,915	2,875	7,202
Catch	3,809	1,346	5,102	6,680	8,078	6,795	22,378	6,691	9,742	16,628
Harvest	695	519	1,190	1,689	787	971	6,294	2,118	1,870	4,706
Mean catch rate	0.8	0.4	2.3	1.8	2.3	1.5	1.8	2.3	3.4	2.3
Stocking cost						\$77,277	\$78,545	\$78,395	\$48,702	\$25,562
Cost-per-day of fishing						\$16.86	\$6.21	\$26.89	\$16.94	\$3.55
Cost-per-fish caught						\$11.37	\$3.51	\$11.72	\$5.00	\$1.54
Cost-per-fish harvested						\$79.58	\$12.48	\$37.01	\$26.04	\$5.43

fish throughout the year. Prior to altering our stocking strategy, anglers expressed frustration with these fisheries because by spring there were too few large fish.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
Salmon (king and silver)	10 in combination	No size limit
Rainbow trout	10	No size limit
Arctic grayling	5	No size limit
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 12,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 27. Fish stockings for 1999 and 2000 are summarized in Table 28 and projected fish stockings for 2001 and 2002 are summarized in Table 29.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 3,039 to 8,704 angler-days and averaged about 6,603 angler-days (Table 30). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 15. Since 1990, 56% of the catch and 73% of the harvest of stocked game fish was made up of rainbow trout. Arctic grayling were next in significance by numbers of fish caught and harvested followed by Arctic char, Coho and chinook salmon (landlocked silvers and kings), and lake trout in decreasing order (Figure 16). Average annual effort per surface acre for stocked species is about 8.1 angler-days. The average catch rate (catch / effort) for stocked fish in rural lakes in the LTMA is about 2.1 fish per angler-day of effort (Table 31). The annual cost of producing and stocking fish (stocking cost) has ranged from about \$5,611 to \$58,094 while the annual cost-per-day of fishing (cost / effort) ranged from \$0.64 to \$7.50 (Table 31).

Table 27.-Actions for small rural lakes in the LTMA.

Lake	Lake Size in Acres	Species	Stocking Years
Chena Hot Springs Road			
CHSR 30.0 Mile Pit	2	Rainbow, Grayling	Annual, Annual
CHSR 45.5 Mile Pit	10	Rainbow, Grayling	Even Years, Odd Years
CHSR 47.9 Mile Pit	6	Rainbow, Grayling	Even Years, Odd Years
Steese Highway			
Olnes Pond	5	Rainbow, Grayling	Even Years, Odd Years
ST. H. 29.5 Mile Pit	9	Rainbow, Grayling	Even Years, Odd Years
ST. H. 31.6 Mile Pit	4	Rainbow, Grayling	Even Years, Odd Years
ST. H. 33.0 Mile Pit	7	Rainbow, Grayling	Even Years, Odd Years
ST. H. 33.5 Mile Pit	3	Rainbow, Grayling	Even Years, Odd Years
ST. H. 34.6 Mile Pit	6	Rainbow, Grayling	Even Years, Odd Years
ST. H. 35.8 Mile Pit	3	Rainbow, Grayling	Even Years, Odd Years
ST. H. 36.6 Mile Pit	9	Rainbow, Grayling	Even Years, Odd Years
Richardson Highway			
Johnson R. #1 Pit	14	Rainbow, Grayling	Annual, Annual
Little Harding Lake	54	Rainbow	Annual
Manchu Lake	43	Char, Rainbow	Odd Years, Even Years
Rich. H. 28 M. Pit	8	Coho, Rainbow	Annual, Annual
Rich. H. 31 M. Pit	18	Char, Rainbow	Even Years, Annual
Parks Highway			
Hanger Pit	13	Rainbow, Grayling	Annual, Annual
Long Pond	7	Grayling	Annual
Lost Lake	94	Char, Lake Trout, Rainbow	Even Years, Odd Years, Annual
Otto Lake	100	Coho, Rainbow	Annual, Annual
Parks 261 Pond	1	Rainbow	Annual
Round Pond	4	Grayling	Annual
Summit Lake	400	Lake Trout	Even Years

Table 28.-Summary of game fish stocking activities for small rural lakes in the LTMA, 1999-2000.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
1999					
Arctic char			1,344	3,550	4,894
Arctic grayling		900			900
Coho salmon			800	2000	2,800
Lake trout		500			500
Rainbow trout	92	12,065		10,023	22,180
Total	92	13,465	2,144	15,573	31,274
2000					
Arctic char					
Arctic grayling		2,100			2,100
Coho salmon				2,800	2,800
Lake trout		10,000			10,000
Rainbow trout	177	15,778		1,000	16,955
Total	177	27,878		3,800	31,855

Table 29.-Summary of projected game fish stockings for small rural lakes in the LTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
1/0	Arctic Char	Subcatchable	5-6	3,200	
0/4	Arctic Char	Catchable	6-8		6,300
1/1	Coho Salmon	Fingerling	3-5	2,000	2,000
15/5	Grayling	Catchable	6-8	4,000	1,500
1/0	Lake Trout	Catchable	6-8	500	
0/1	Rainbow Trout	Fingerling	2-4		2,000
21/21	Rainbow Trout	Catchable	6-8	14,750	14,750
2/2	Rainbow Trout	Broodstock	12-16	125	125

Table 30.-Effort, harvest, and catch statistics by species for small rural lakes in the LTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	1,075	2,485	2,211	3,339	3,148	3,768	3,004	3,423	4,251	3,458
Number of Days Fished (effort)	3,039	5,280	3,756	7,716	7,710	7,741	8,377	6,291	7,412	8,704
Catch										
Rainbow trout	3,246	4,636	1,574	9,624	7,793	4,594	9,817	11,241	12,909	15,931
Coho/Chinook salmon	1,030	369	162	172	22	76	118	382	92	5
Arctic grayling	1,165	3,057	3,072	6,199	11,759	3,813	2,742	6,824	9,087	7,674
Arctic char	61	15	279	1,658	1,194	593	151	834	277	552
Lake trout	14	65	213	45	43	120	472	59	47	168
Total	5,515	8,141	5,300	17,699	20,811	9,196	13,299	19,339	22,412	24,330
Harvest										
Rainbow trout	1,449	2,439	517	2,056	1,910	1,192	3,396	2,915	2,695	6,705
Coho/Chinook salmon	422	235	76	68	22	0	0	31	2	0
Arctic grayling	226	709	289	900	1,393	469	66	196	390	942
Arctic char	61	15	95	1,001	644	210	32	188	36	353
Lake trout	7	53	42	9	7	18	55	24	7	95
Total	2,165	3,451	1,019	4,034	3,975	1,889	3,549	3,353	3,130	8,096

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

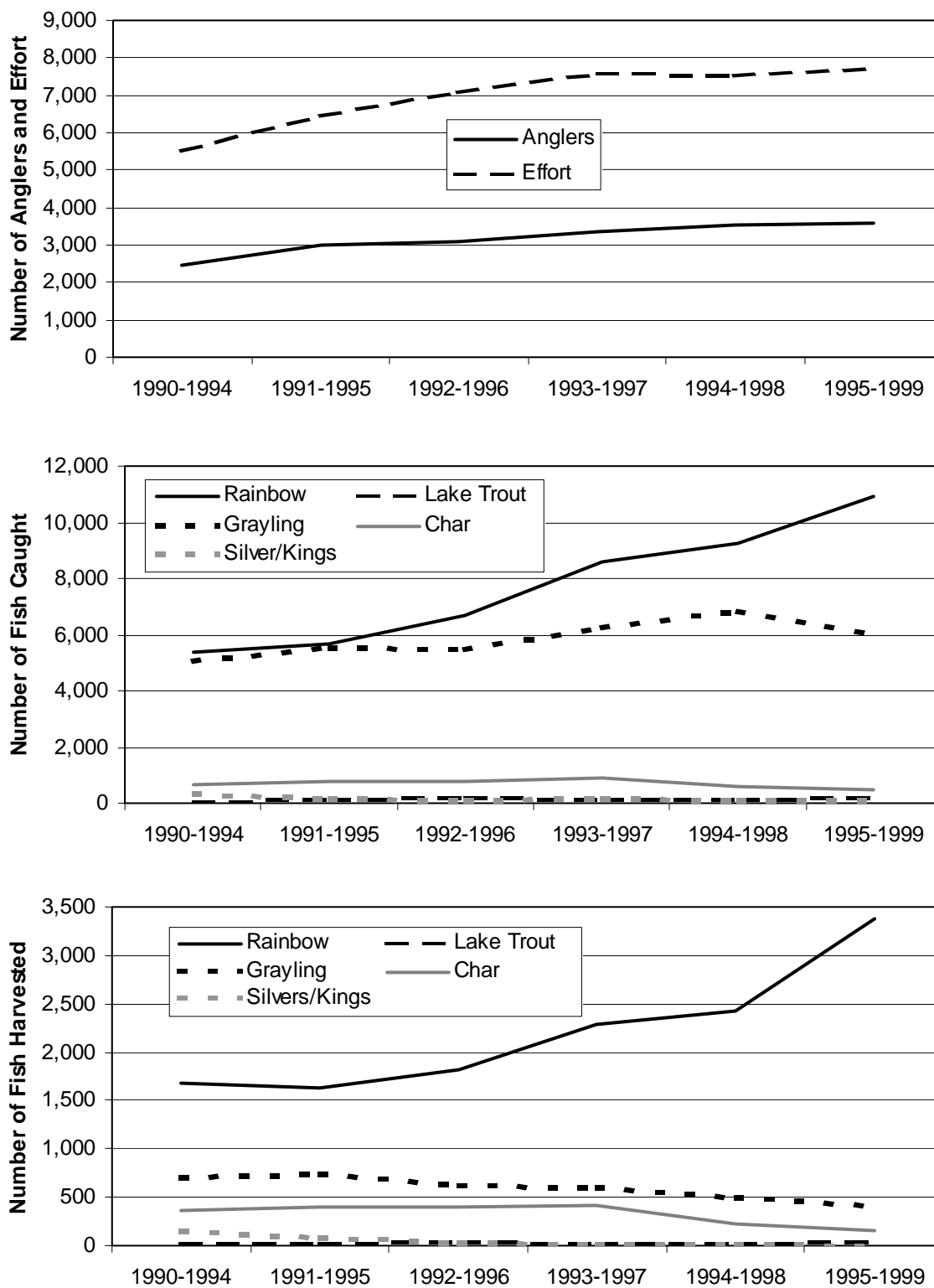


Figure 15.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from LTMA small rural lakes, 1990-1999.

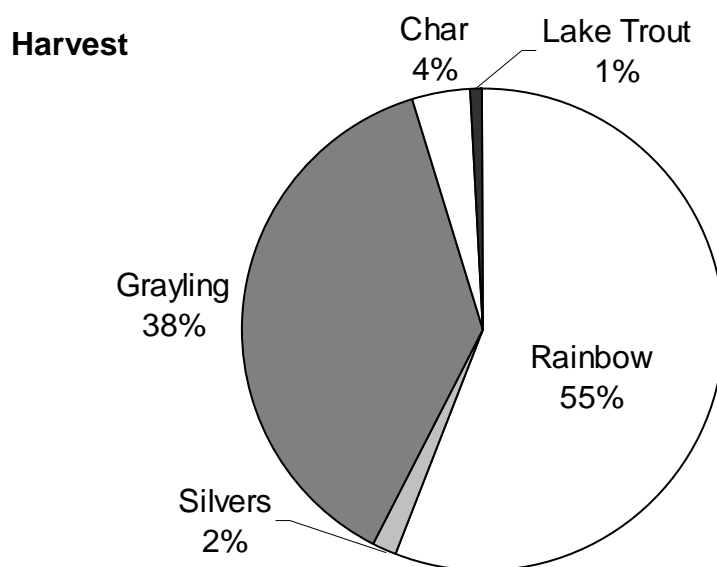
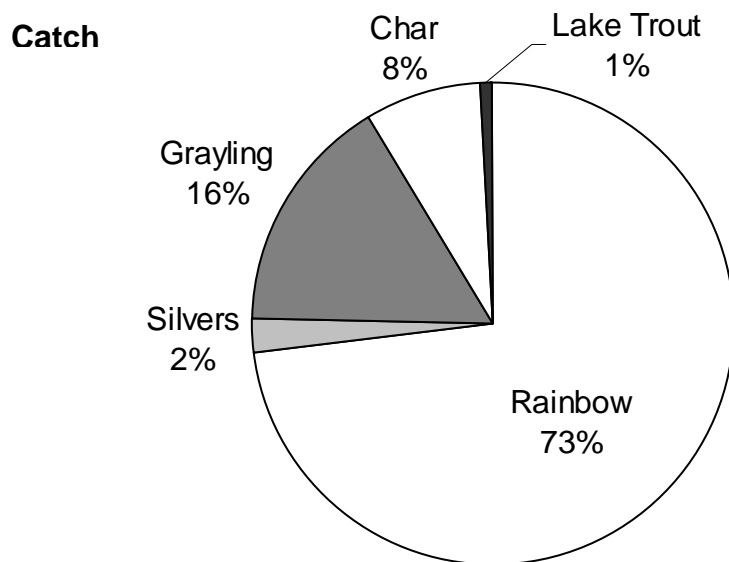


Figure 16.-Ten year average catch and harvest composition by species for small rural lakes in the LTMA, 1990-1999.

Table 31.-Fishery statistics for LTMA small rural lakes, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished	3,039	5,280	3,756	7,716	7,710	7,741	8,377	6,291	7,412	8,704
Catch	5,515	8,141	5,300	17,699	20,811	9,196	13,299	19,339	22,412	24,330
Harvest	2,165	3,451	1,019	4,034	3,975	1,889	3,549	3,353	3,130	8,096
Mean catch rate	1.8	1.5	1.4	2.3	2.7	1.2	1.6	3.1	3.0	2.8
Stocking cost						\$58,094	\$47,219	\$42,477	\$16,752	\$5,611
Cost-per-day of fishing						\$7.50	\$5.64	\$6.75	\$2.26	\$0.64
Cost-per-fish caught						\$6.32	\$3.55	\$2.20	\$0.75	\$0.23
Cost-per-fish harvested						\$30.76	\$13.30	\$12.67	\$5.35	\$0.69

Lower Tanana Valley Remote Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game stocks remote lakes in the lower Tanana Valley to provide fishing opportunities for popular game species in locations where fishing opportunities don't exist or are limited. The remote lakes stocking program serves a segment of the public who is willing to travel away from the road system to access lakes that are visited by few anglers. These lakes range in size from 4 to 255 acres.

Generally, the remote lakes are stocked with fingerlings (2-4 inches) because smaller fish are easier and less expensive to transport than larger fish. Most stockings are done with aircraft or ATV. All of these lakes can produce sufficient numbers of catchable fish from fingerling stockings to sustain the existing fisheries. Because these lakes are more difficult to reach the level of effort and harvest is less than that for comparable size lakes near the road system. For this same reason these lakes generally have larger fish and more of them.

Some of the remote lakes are stocked with two or more species. Instead of stocking all species each year, different species are stocked in alternate years. For example, rainbow trout are stocked in Dune lake on odd years while Arctic grayling and coho salmon are stocked on even years. This strategy cuts in half the number of trips needed to maintain these fisheries and reduces stocking costs.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
Salmon (king and silver)	10 in combination	No size limit
Rainbow trout	10	No size limit
Arctic grayling	5	No size limit
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 3,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 32. Fish stockings for 1999 and 2000 are summarized in Table 33 and projected fish stockings for 2001 and 2002 are summarized in Table 34.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Table 32.-Actions for remote stocked lakes in the lower Tanana Valley.

Lake	Lake Size in Acres	Species	Stocking Years
Dune Lake	179	Coho, Rainbow, Grayling	Even Years, Odd Years, Even Years
Firebreak Lake	100	Rainbow	Odd Years
Geskakmina Lake	255	Coho, Rainbow	Even Years, Odd Years
Les' Lake	4	Rainbow, Grayling	Even Years, Odd Years
Triangle Lake	106	Rainbow	Odd Years
Tschute	150	Rainbow	Odd Years

Table 33.-Summary of game fish stocking activities for small remote lakes in the LTMA, 1999-2000.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
1999					
Arctic char					
Arctic grayling					
Coho salmon					
Lake trout					
Rainbow trout				42,883	42,883
Total				42,883	42,883
2000					
Arctic char					
Arctic grayling				10,794	10,794
Coho salmon				18,489	18,489
Lake trout					
Rainbow trout				5,009	5,009
Total				34,292	34,292

Table 34.-Summary of projected game fish stockings for small remote lakes in the LTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
0/2	Coho Salmon	Fingerling	3-5		17,750
0/1	Grayling	Fingerling	3-5		10,000
1/0	Grayling	Catchable	6-8	200	
6/1	Rainbow Trout	Fingerling	2-4	67,750	1,000

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 894 to 2,272 angler-days and averaged about 1,507 angler-days (Table 35). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 17. Since 1990, 52% of the catch and 50% of the harvest of stocked game fish was made up of rainbow trout. Coho salmon (landlocked silvers) are next significant in numbers of fish caught and harvested followed by Arctic grayling, lake trout, and Arctic char in decreasing order (Figure 18). Average annual effort per surface acre for stocked species is about 19.7 angler-days. The average catch rate (catch / effort) for stocked fish in remote lakes in the LTMA is about 4.9 fish per angler-day of effort (Table 36). The annual cost of producing and stocking fish (stocking cost) has ranged from about \$10,307 to \$18,450 while the annual cost-per-day of fishing (cost / effort) ranged from \$8.31 to \$11.53 (Table 36).

SECTION III: UPPER TANANA MANAGEMENT AREA STOCKED WATERS

BACKGROUND AND HISTORICAL PERSPECTIVE

The Alaska Department of Fish and Game (ADF&G) stocks game fish in 46 to 50 lakes Upper Tanana Drainage Management Area (UTMA). Major population centers include Delta Junction, Tok, and the Fort Greely military installation. The stocking program is designed to provide additional fishing opportunities near communities and popular recreational destinations where fish resources and angling opportunity are limited and where fishing effort and harvest are highest. Lakes in the stocking program range in size from a few acres to 1,500 acres and are accessible by road, trail, ATV or aircraft. Most of the fisheries are year round and half of the angling effort on some lakes occurs during winter. The stocking program also generates an important conservation benefit because it diverts harvest away from wild populations. ADF&G has no conservation concern with stocked waters except in a few lakes where wild game fish such as northern pike and burbot are present. Fisheries in all stocked waters are maintained through fish stockings.

Quartz Lake is the only major stocked fisheries in the UTMA and it accounts for most of the angler effort and harvest. Numerous small lakes scattered through out the UTMA also receive considerable attention from anglers. In 1999, anglers fishing in the UTMA generated an estimated 46,886 angler-days of effort. About 23,126 angler-days of effort was directed toward stocked fish. The catch and harvest in stocked waters were estimated at 95,262 and 31,237 fish. In 1999, the stocking program accounted for 49% of the total effort, 57% of the total catch and 77% of the total harvest in the UTMA. The estimated total annual net economic value for just Quartz Lake was about \$1,729,794 (SE = 178,524) in 1995 (Duffield, Neher, and Merritt *unpublished*). Estimated cost of the stocking program for these waters in 1995 was \$114,060.

Today, ADF&G provides diverse year-round sport fishing in the UTMA for rainbow trout, chinook and coho salmon, Arctic grayling, Arctic char, and lake trout. Goals of the fish stocking program in the UTMA are:

1. reduce harvest pressure on wild stocks;
2. provide angling opportunity for increasing numbers of anglers;
3. diversify angling opportunity (species, location, and access); and,
4. rehabilitate depleted wild stocks.

Table 35.-Effort, harvest, and catch statistics by species for small remote lakes in the LTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	973	803	1,089	730	823	685	1,063	769	586	877
Number of Days Fished (effort)	2,272	1,014	1,629	1,544	1,166	1,603	2,220	1,244	894	1,488
Catch										
Rainbow trout	2,823	1,390	3,285	3,692	3,254	5,085	5,220	3,117	2,586	5,508
Coho/Chinook salmon	1,824	2,200	962	553	316	2,272	2,735	2,150	2,260	1,480
Arctic grayling	1,975	1,847	1,067	953	3,050	621	2,238	1,402	870	813
Arctic char	27	0	82	264	79	15	81	26	108	0
Lake trout	14	21	838	287	6	14	93	89	3	106
Total	6,662	5,457	6,234	5,750	6,705	8,007	10,366	6,783	5,827	7,907
Harvest										
Rainbow trout	790	793	231	443	1,162	803	1,337	675	736	2,154
Coho/Chinook salmon	523	1,125	422	334	89	479	937	473	544	460
Arctic grayling	378	673	174	96	857	82	310	109	31	449
Arctic char	27	0	29	115	8	2	22	26	2	0
Lake trout	7	9	42	41	0	14	56	54	0	101
Total	1,725	2,600	898	1,029	2,115	1,380	2,662	1,336	1,313	3,165

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

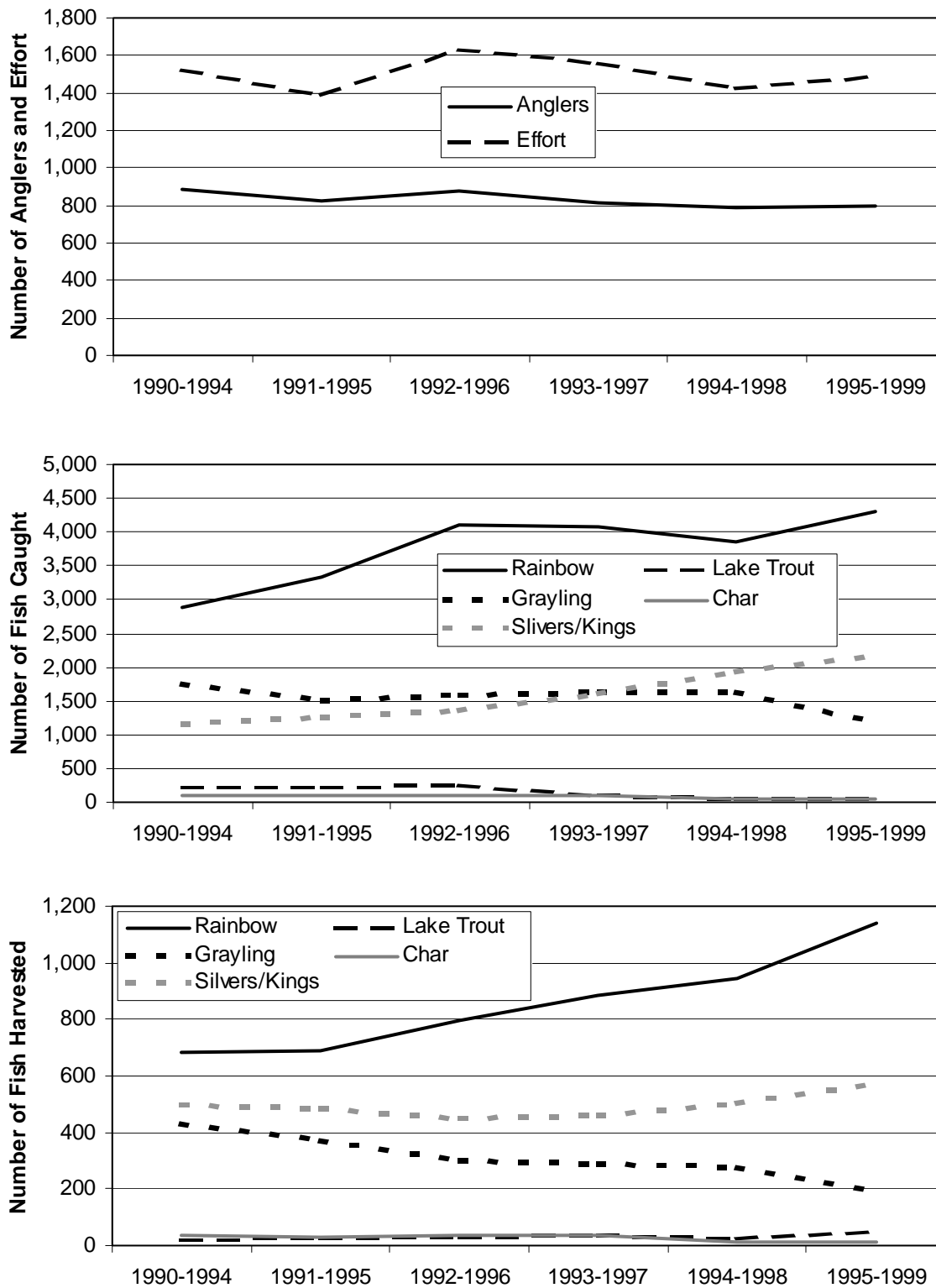


Figure 17.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from LTMA small remote lakes, 1990-1999.

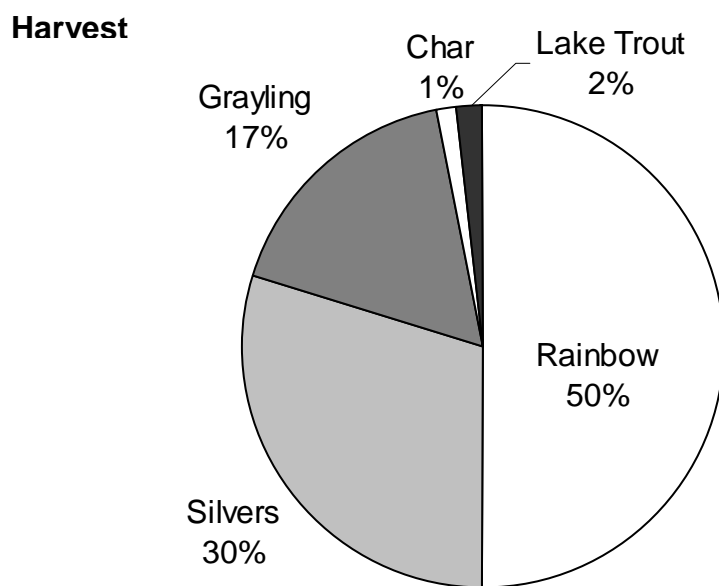
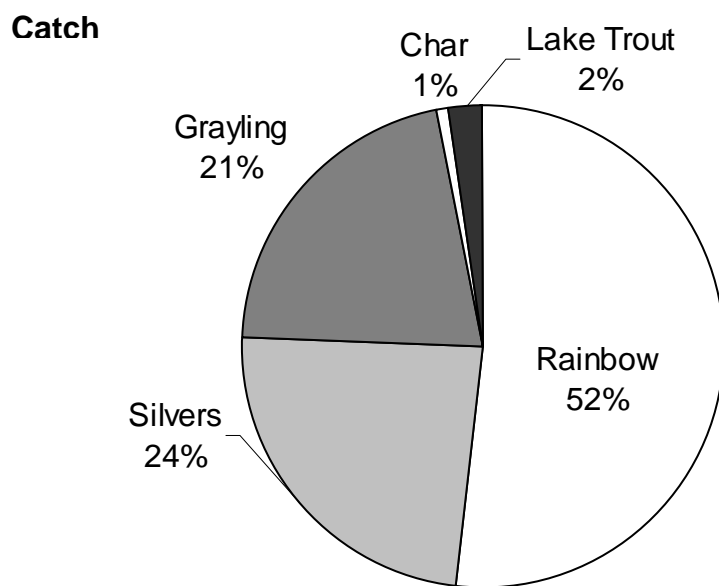


Figure 18.-Ten year average catch and harvest composition by species for small remote lakes in the LTMA, 1990-1999.

Table 36.-Fishery statistics for small remote lakes in the LTMA, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished	2,272	1,014	1,629	1,544	1,166	1,603	2,220	1,244	894	1,488
Catch	6,662	5,457	6,234	5,750	6,705	8,007	10,366	6,783	5,827	7,907
Harvest	1,725	2,600	898	1,029	2,115	1,380	2,662	1,336	1,313	3,165
Mean catch rate	2.9	5.4	3.8	3.7	5.8	5.0	4.7	5.5	6.5	5.3
Stocking cost						\$15,460	\$18,450	\$13,633	\$10,307	\$14,043
Cost-per-day of fishing						\$9.65	\$8.31	\$10.96	\$11.53	\$9.44
Cost-per-fish caught						\$1.93	\$1.78	\$2.01	\$1.77	\$1.78
Cost-per-fish harvested						\$11.21	\$6.93	\$10.21	\$7.85	\$4.44

Meeting public demand for recreational fishing opportunities in Alaska while at the same time maintaining and protecting the wild fishery resources has become increasingly complex. Today, Alaska is experiencing increased tourism and continued forest, mineral, petroleum, and associated government development. A growing avid recreation-oriented population accompanies this growing economy. Accessible sport fisheries have become crowded, new fisheries have developed, and pressure from a large mobile population is spilling ever farther a field. Stocking serves to divert angling pressure away from fragile stocks and maintain angling opportunities. Consequently, stocking has become a vital component of the statewide sport fish program.

Funding for the recreational fish stocking comes primarily from two sources. The first is the Sport Fish Account of the state Fish and Game fund, which includes revenues from sales of fishing licenses. The second, and larger funding component for this program, is comprised of federal funds. The Federal Aid in Sport Fisheries Restoration program, through the Dingell Johnson (D-J) Fund and the Wallop-Breaux Amendment (W-B), provides money from federal taxes on specific sporting goods, marine motor fuels, etc.

FISHERY STATISTICS FOR THE UPPER TANANA MANAGEMENT AREA, 1990-1999

From 1990 through 1999, the stocking program in the Upper Tanana Management Area (UTMA) generated from 12,278 to 29,162 angler-days annually (Table 37). This represents about 40% to 51% of the total annual estimated fishing effort for both stocked and wild species in the UTMA. Over the same period, annual catch of stocked fish ranged from 45,509 to 95,262 fish and annual harvest ranged from 16,644 to 48,085 fish (Table 37). These numbers represent about 37% to 57% of the total annual catch and from 55% to 77% of the total annual harvest of both wild and stocked fish in the UTMA. Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 19. Almost 70% of the catch and harvest of stocked fish in the UTMA was comprised of rainbow trout. Coho and chinook salmon (landlocked silvers and kings) were next in significance by numbers of fish caught and harvested followed by Arctic char, Arctic grayling, and lake trout in decreasing order (Figure 20). The average catch rate (catch / effort) for stocked fish in the UTMA is about 3.3 fish per angler-day of effort (Table 38). Since 1995, the cost of producing and stocking fish (including evaluation and support activities) has ranged from about \$83,914 to \$155,833 while the cost-per-day of fishing (cost / effort) ranged from \$5.26 to \$11.27 (Table 38). Fish stockings for 1998 through 2000 are summarized in Table 39 and projected fish stockings for 2001 and 2002 are summarized in Table 40.

The ADF&G will continue to stock lakes that provide fishing opportunities and where stocked fish exhibit good survival, growth, or provide put and take fisheries. New lakes will be evaluated as candidates in the stocking program based on public requests for new fisheries. Management plans and stocking methods for existing fisheries will be reviewed and modified to reflect changing public desire and use. Research activities will be conducted to assess public desire and use of stocked waters, evaluate progress toward achieving management objectives, and to address important fishery concerns.

Objectives, actions, and evaluations for the stocking program are listed separately for each fishery management plan within the UTMA (Quartz Lake, Rural Small Lakes, and Remote Small Lakes).

Table 37.-Effort, harvest, and catch statistics by species for stocked fisheries in the UTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	12,628	12,679	10,857	12,507	11,522	13,413	9,980	7,128	7,696	8,461
Number of Days Fished (effort)	27,595	23,214	18,454	29,162	24,380	26,711	21,482	12,278	13,613	23,126
Catch										
Rainbow trout	65,047	54,039	38,258	60,450	37,811	41,979	35,003	32,652	49,049	63,723
Coho/Chinook salmon	20,425	17,019	15,122	20,887	12,865	10,960	15,597	9,207	15,924	18,201
Arctic grayling	4,456	4,324	850	3,930	5,289	1,437	3,046	1,939	3,097	3,145
Arctic char	778	3,326	1,098	3,461	1,899	1,656	2,351	1,342	3,400	9,200
Lake trout	304	1,070	625	1,707	1,678	541	162	370	136	994
Total	91,009	79,777	55,952	90,434	59,540	56,572	56,158	45,509	71,606	95,262
Harvest										
Rainbow trout	28,831	32,014	17,404	23,141	16,396	18,198	16,328	12,394	19,303	21,914
Coho/Chinook salmon	7,377	11,575	7,183	10,056	6,723	4,910	6,724	3,129	6,710	6,533
Arctic grayling	1,283	2,231	343	362	1,162	440	381	322	123	135
Arctic char	153	1,874	197	1,106	522	694	767	688	1,409	2,356
Lake trout	118	391	177	368	810	262	61	111	7	300
Total	37,761	48,085	25,303	35,032	25,612	24,503	24,260	16,644	27,552	31,237

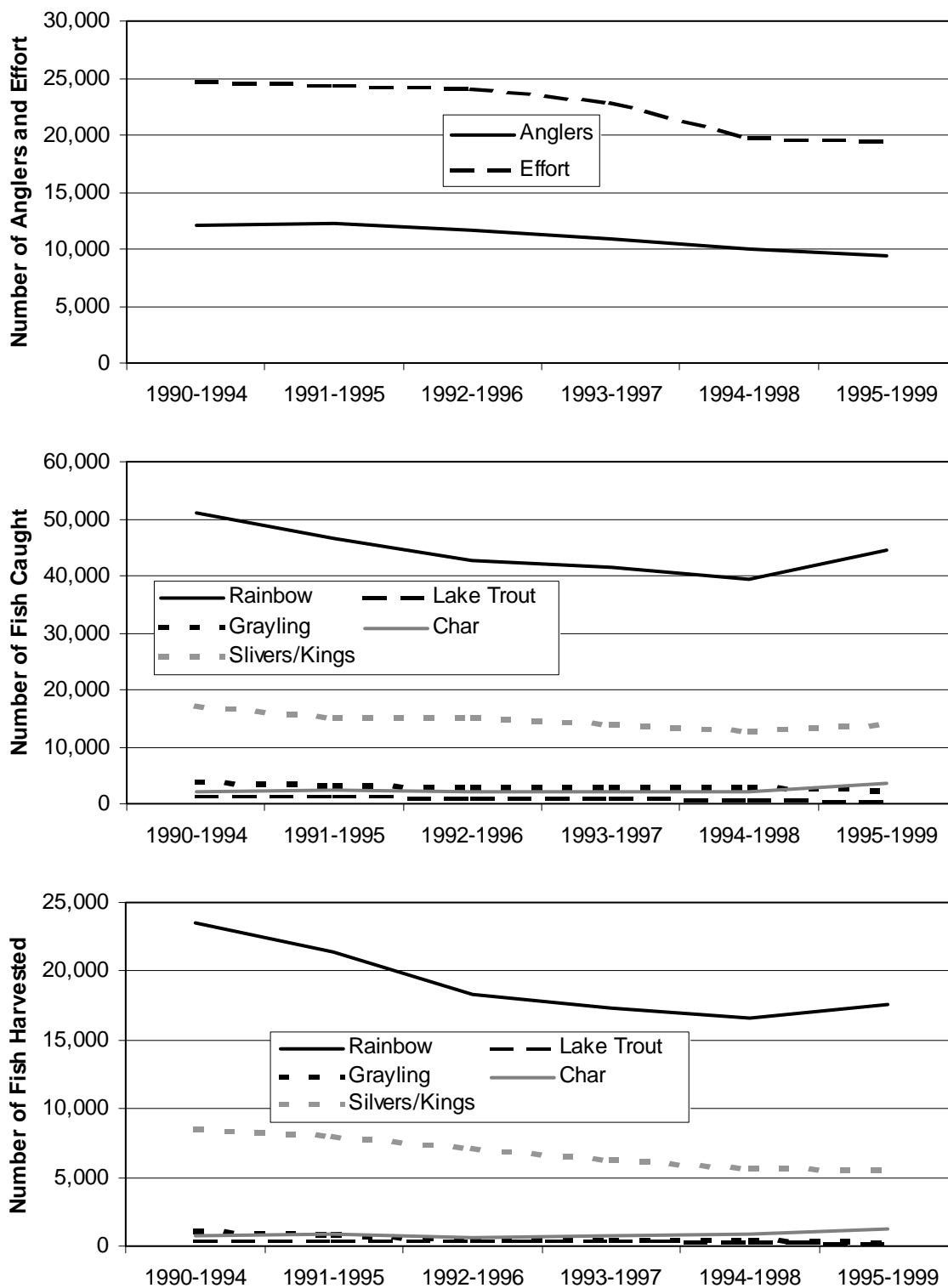
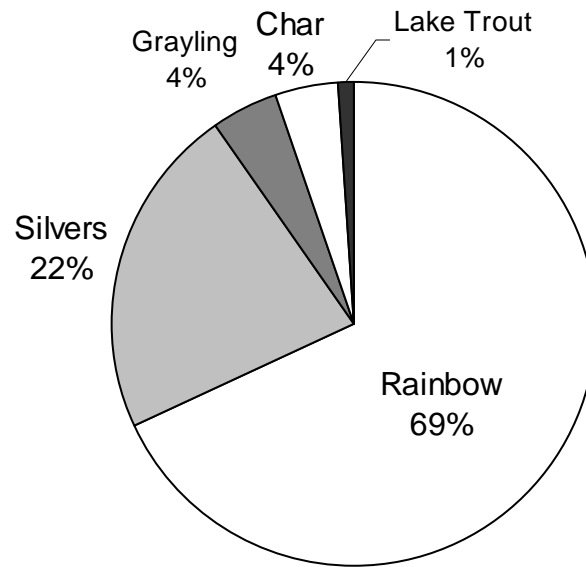


Figure 19.-Five-year averages for UTMA fisheries.

Catch



Harvest

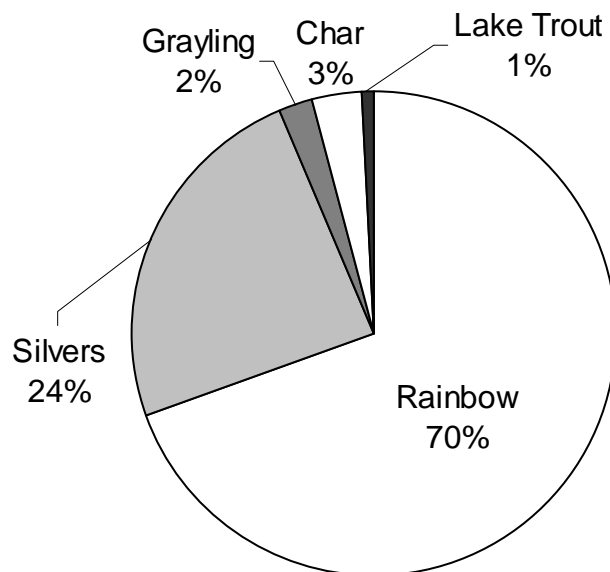


Figure 20.-Ten year average catch and harvest composition by species for all stocked lakes in the UTMA, 1990-1999.

Table 38.-Summary of fishery statistics for the UTMA, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	27,229	23,095	18,296	28,804	24,271	26,508	20,975	12,070	13,467	22,919
Catch	90,531	79,507	55,773	89,826	59,300	56,442	55,307	45,141	71,065	94,954
Harvest	37,666	47,938	25,250	34,908	25,478	24,465	24,053	16,554	27,387	31,143
Catch rate (catch / effort)	3.3	3.4	3.0	3.1	2.4	2.1	2.6	3.7	5.3	4.1
Stocking cost						\$155,833	\$124,477	\$135,980	\$83,914	\$120,648
Cost-per-day of fishing						\$5.88	\$5.93	\$11.27	\$6.23	\$5.26
Cost-per-fish caught						\$2.76	\$2.25	\$3.01	\$1.18	\$1.27
Cost-per-fish harvested						\$6.37	\$5.18	\$8.21	\$3.06	\$3.87

Table 39.-Summary of stocking activities for the UTMA, 1998-2000.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
1998					
Arctic Char		917			917
Arctic Grayling		358			358
Lake Trout			3,750		3,750
Rainbow Trout		2,871		339,300	342,171
Coho Salmon				81,662	81,662
Total		4,146	3,750	420,962	428,858
1999					
Arctic Char			7,971	11,047	19,018
Arctic Grayling		1,896			1,896
Rainbow Trout		8,274		482,431	490,705
Coho Salmon				78,727	78,727
Total		10,170	7,971	572,205	590,346
2000					
Arctic Char		700			700
Arctic Grayling		550			550
Chinook Salmon		10,438			10,438
Lake Trout		9,028			9,028
Rainbow Trout	25	8,357		381,729	390,111
Coho Salmon				99,299	99,299
Salmonid Hybrid		469			469
	25	29,542		481,028	510,595

Table 40.-Summary of projected game fish stockings for the UTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
14/0	Arctic Char	Subcatchable	5-6	19,725	0
0/1	Chinook Salmon	Catchable	6-8	0	10,000
¼	Coho Salmon	Fingerling	6-8	60,000	75,600
8/0	Arctic Grayling	Catchable	2-4	2,650	0
0/0	Lake Trout	Subcatchable	2-4	0	0
28/8	Rainbow Trout	Fingerling	6-8	443,300	319,800
6/5	Rainbow Trout	Catchable	5-6	6,800	6,300
2/1	Rainbow Trout	Broodstock	12-16	75	40

Quartz Lake Sport Fishery Enhancement

Quartz Lake is about 25 miles north of Delta Junction along the Richardson Highway. The ADF&G currently stocks Quartz Lake (1,500 acres) with rainbow trout, landlocked silver (coho) and king (chinook) salmon, and Arctic char. By stocking a variety of game fish species into Quartz Lake, ADF&G provides a diversity that is attractive to anglers. The availability of stocked game fish in roadside lakes creates year-round fishing opportunity otherwise unavailable in Interior Alaska. Creel surveys conducted by ADF&G indicate that about half of the annual fishing effort occurs in summer during the open water period and the other half occurs through the late fall, winter, and early spring during the ice covered period. Results from angler opinion surveys of Tanana Valley residents conducted by ADF&G in 1985 and in 1988 indicated that about 80% of the respondents approved of stocking fish as a means to improve fishing.

Quartz Lake and other stocked lakes absorb effort that might otherwise be directed toward wild stocks that are vulnerable to over-fishing. Increasingly restrictive regulations have been implemented to protect wild stocks in interior Alaska. As fishing and harvest pressures on these stocks have increased, the abundance (number of fish) and quality (proportion of large fish) of these fisheries declined. Stocking of hatchery fish has become an increasingly effective management option for meeting the demand for recreational fishing opportunities and protecting over fished wild stocks in the Tanana Valley. Results from ADF&G questionnaires sent to license holders in the Tanana Drainage indicated anglers targeted Arctic grayling (primarily wild stocks) more than other species. Rainbow trout were the next most commonly targeted species. Surveys conducted in 1980, 1985, and again in 1988 showed that the percentage of anglers fishing specifically for rainbow trout increased for each survey; while at the same time, the percentage targeting Arctic grayling decreased.

The Quartz Lake fishery is managed as a consumptive fishery, allowing anglers to harvest up to the daily bag limit of any of the stocked species. Daily bag and possession limits are:

Species	Daily Bag and Possession Limit	Size Limit
Salmon (coho/chinook)	10 in combination	no size limit
Arctic char	10	no size limit
Rainbow trout	10	no size limit

Objectives

1. Provide a minimum of 12,000 annual angler days or more of sport fishing effort.
2. Provide diverse sport angling opportunities through the annual or alternate year stocking of rainbow trout, coho salmon, and Arctic char.
3. Maintain an annual mean catch rate in excess of two sport fish per angler day while allowing anglers to keep the portion of their catch they so desire.

Actions

1. Biennially stock 11,000 fingerling Arctic char.
2. Annually stock 80,000 fingerling coho salmon.
3. Annually stock 350,000 fingerling rainbow trout.

Fish stockings for 1998 through 2000 are summarized in Table 41 and projected fish stockings for 2001 and 2002 are summarized in Table 42.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Performance or status of stocking cohorts may be evaluated through on-site creel surveys and/or field sampling.

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 6,956 to 19,746 angler-days and averaged about 14,704 angler-days (Table 43). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 21. About 69% of the catch and harvest is comprised of rainbow trout. Coho and chinook salmon (landlocked silvers and kings) are next significant in numbers of fish caught and harvested followed by Arctic char (Figure 22). Average annual effort per surface acre is about 9.8 angler-days. The average catch rate (catch / effort) for Quartz Lake is about 3.6 fish per angler-day of effort (Table 44). The cost of producing and stocking fish (stocking cost) has ranged from about \$71,547 to \$114,060 while the cost-per-day of fishing (cost / effort) ranged from \$4.01 to \$13.86 (Table 44).

Table 41.-Summary of stocking activities for Quartz Lake, 1998-2000.

Species	Catchable	Subcatchable	Fingerling	Total
1998				
Coho salmon			65,898	65,898
Rainbow trout			328,500	328,500
Total			394,398	394,398
1999				
Arctic char			11,047	11,047
Coho salmon			78,727	
Rainbow trout	647		344,993	345,640
Total	647		434,767	435,414
2000				
Coho salmon			99,299	99,299
Chinook Salmon		10,000		10,000
Rainbow trout			352,731	352,731
Total		10,000	452,030	462,030

Table 42.-Summary of projected game fish stockings for Quartz Lake, 2001-2002.

Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
Arctic Char	Subcatchable	5-6	10,000	
Coho Salmon	Subcatchable	5-6	60,000	60,000
Chinook Salmon	Catchable	7-8		10,000
Rainbow Trout	Fingerling	6-8	300,000	300,000

Table 43.-Effort, harvest, and catch statistics by species for Quartz Lake 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers	9,824	9,899	8,065	9,039	7,962	9,133	6,853	4,445	5,821	6,140
Number of Days Fished (effort)	19,746	15,478	13,486	17,613	14,031	17,569	14,163	6,956	10,175	17,820
Catch										
Rainbow trout	47,568	44,679	30,294	43,654	23,675	28,684	23,051	19,729	36,416	54,463
Coho/Chinook salmon	19,918	16,313	14,862	19,233	11,212	10,210	15,404	8,902	13,320	16,740
Arctic char	0	0	0	0	0	413	706	497	2,726	8,859
Total	67,486	60,992	45,156	62,887	34,887	39,307	39,161	29,128	52,462	80,062
Harvest										
Rainbow trout	20,847	28,238	13,544	18,699	11,556	12,585	11,687	8,496	14,335	19,066
Coho/Chinook salmon	7,309	11,054	7,053	8,977	5,706	4,633	6,724	2,999	5,526	6,018
Arctic char	0	0	0	0	0	174	330	313	1,201	2,321
Total	28,156	39,292	20,597	27,676	17,262	17,392	18,741	11,808	21,062	27,405

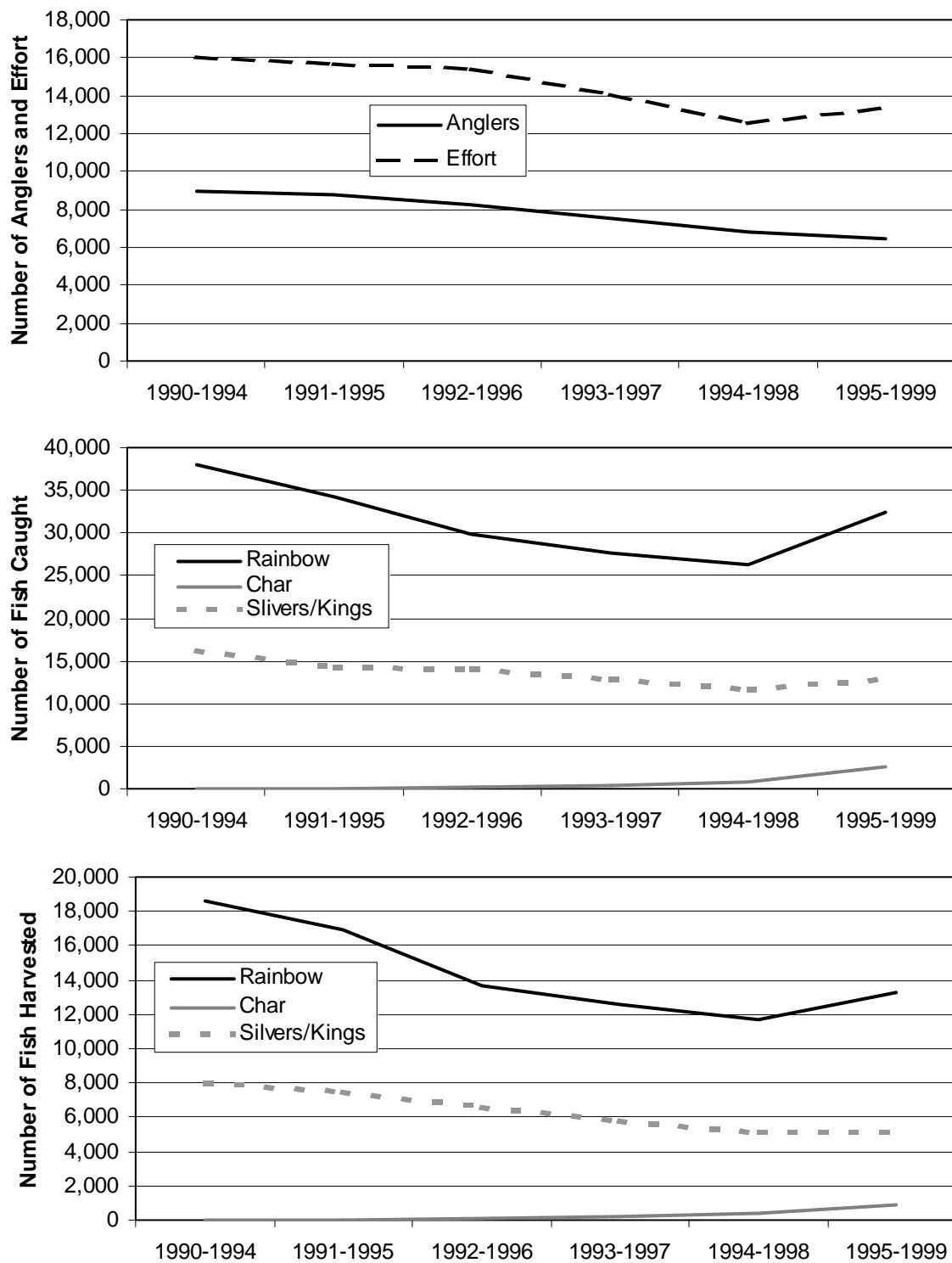
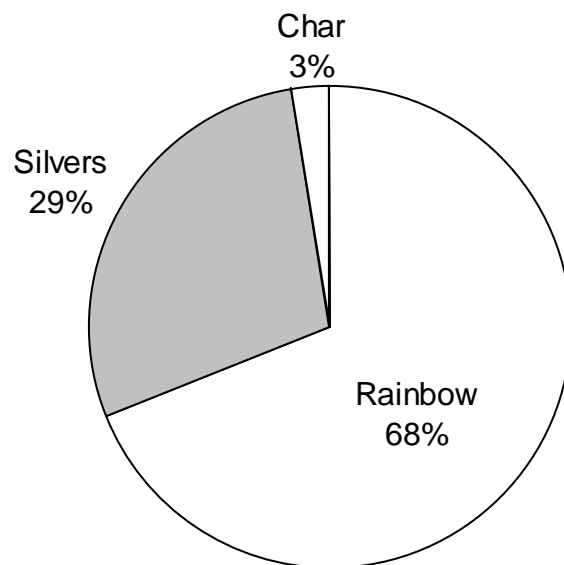


Figure 21.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from Quartz Lake, 1990-1999.

Catch



Harvest

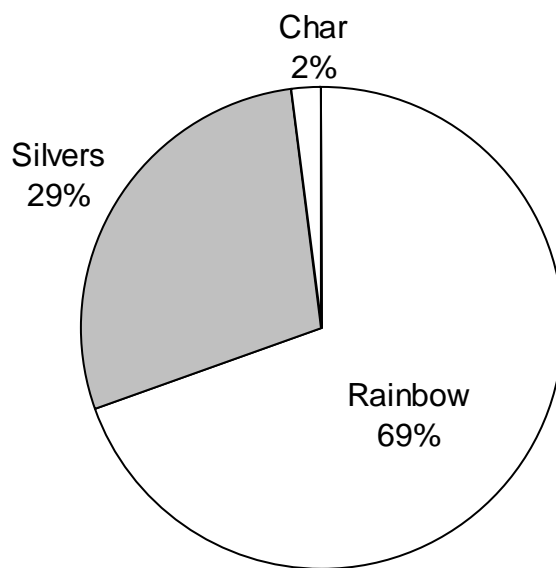


Figure 22.-Ten year average catch and harvest composition by species for Quartz Lake, 1990-1999.

Table 44.-Summary of fishery statistics for the Quartz Lake, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	19,746	15,478	13,486	17,613	14,031	17,569	14,163	6,956	10,175	17,820
Catch	67,486	60,992	45,156	62,887	34,887	39,307	39,161	29,128	52,462	80,062
Harvest	28,156	39,292	20,597	27,676	17,262	17,392	18,741	11,808	21,062	27,405
Catch rate (catch / effort)	3.4	3.9	3.3	3.6	2.5	2.2	2.8	4.2	5.2	4.5
Stocking cost						\$114,060	\$94,660	\$96,404	\$74,841	\$71,547
Cost-per-day of fishing						\$6.49	\$6.68	\$13.86	\$7.36	\$4.01
Cost-per-fish caught						\$2.90	\$2.42	\$3.31	\$1.43	\$0.89
Cost-per-fish harvested						\$6.56	\$5.05	\$8.16	\$3.55	\$2.61

Upper Tanana Valley Rural Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game has been stocking small rural lakes in the upper Tanana Valley for more than 20 years. These rural lakes are along or near the road system and are easily accessed directly by road while access to some may require a short hike or ATV. The rural small lakes stocking program will serve a segment of the public who want to get away from population centers but must remain on the road system. This program provides increased fishing opportunities and offers a diversity of species in rural areas where minimal or no opportunities exist for sport fishing. It also diverts effort from wild populations in areas for which the department has conservation concerns.

The rural small lakes stocking program is intended to provide fishing opportunities and diversify the sport species and fishing experiences available to anglers. This program has created seasonal and year-round fishing opportunities in waters that do not normally support popular game fish. Most of the rural lakes in the UTMA area are less than 100 surface acres and they receive a lot of fishing pressure relative to their size. Currently, most of the lakes can produce sufficient numbers of catchable fish from stockings of fingerlings to meet angler demand.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
Salmon (king and silver)	10 in combination	No size limit
Rainbow trout	10	No size limit
Arctic grayling	5	No size limit
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 6,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 45. Fish stockings for 1999 and 2000 are summarized in Table 46 and projected fish stockings for 2001 and 2002 are summarized in Table 47.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Table 45.-Actions for rural stocked lakes in the UTMA.

Lake	Lake Size in Acres	Species	Stocking Years
Richardson Highway			
81 Mile Rich. H. Pit	3	Rainbow, Grayling	Annual, Odd Years
Big D Pond	20	Rainbow	Annual
Bluff Cabin Lake	72	Rainbow	Odd Years
Donnelly Lake	65	Char, Rainbow	Odd Years, Even Years
Little Lost Lake (at Quartz)	15	Rainbow	Annual
Rapids Lake	5	Lake Trout, Rainbow	Even Years, Odd Years
Shaw Pond	3	Char, Rainbow	Odd Years, Annual
Meadows Road			
Bolio Lake	138	Rainbow	Annual
Bullwinkle Lake	4	Rainbow	Odd Years
Chet Lake	8	Lake Trout, Rainbow	Even Years, Annual
Doc Lake	3	Rainbow	Odd Years
Ghost Lake	5	Lake Trout, Rainbow	Even Years, Odd Years
"J" Lake	15	Coho, Grayling	Even Years, Odd Years
Luke Lake	8	Grayling	Odd Years
Mark Lake	18	Coho, Rainbow	Even Years, Odd Years
Nickel Lake	5	Lake Trout, Rainbow, Grayling,	Even Years, Odd Years, Odd Years
No Mercy Lake	3	Rainbow	Odd Years
North Twin Lake	20	Lake Trout, Rainbow	Even Years, Annual
Sheefish Lake	8	Char, Grayling	Odd Years, Odd Years
South Twin Lake	20	Rainbow	Odd Years
Weasel Lake	8	Rainbow	Even Years
Coal Mine Road			
Backdown Lake	6	Char, Rainbow	Odd Years, Even Years
Brodie Lake	5	Char, Grayling	Odd Years, Odd Years
Coal Mine Road #5	13	Rainbow	Odd Years

- continued -

Table 45.-Page 2 of 2.

Lake	Lake Size in Acres	Species	Stocking Years
Coal Mine Road			
Dick's Pond	5	Char	Odd Years
Ken's Pond	5	Char, Rainbow	Odd Years, Even Years
Last Lake	5	Char, Rainbow	Odd Years, Even Years
Paul's Pond	5	Lake Trout, Grayling	Even Years, Odd Years
Rangeview Lake	5	Char, Grayling	Odd Years, Odd Years
Rockhound Lake	3	Rainbow	Odd Years
Alaska Highway			
Craig Lake	17	Rainbow	Odd Years
Donna Lake	58	Rainbow	Odd Years
Four Mile Lake	100	Lake Trout, Rainbow	Even Years, Odd Years
Hidden Lake (<i>Tetlin R.</i>)	20	Rainbow	Odd Years
Jan Lake	45	Coho, Rainbow	Even Years, Odd Years
Lisa Lake	50	Rainbow	Odd Years
Little Donna Lake	30	Rainbow	Odd Years
Robertson Lake #2	15	Rainbow	Odd Years

Table 46.-Summary of stocking activities for small rural lakes in the UTMA 1998-2000.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
1998					
Arctic Char		917			917
Arctic Grayling		358			358
Lake Trout			3,750		3,750
Rainbow Trout		2,871		10,800	13,671
Coho Salmon				15,764	15,764
Total		4,146	3,750	26,564	34,460
1999					
Arctic Char			7,971		7,971
Arctic Grayling		1,896			1,896
Rainbow Trout		7,627		109,938	117,565
Total		9,523	7,971	109,938	127,432
2000					
Arctic Char		700			700
Arctic Grayling		550			550
Chinook Salmon		438			438
Lake Trout		8,528			8,528
Rainbow Trout	25	8,357		19,998	28,380
Hybrid Salmon		469			469
Total	25	19,042		19,998	39,065

Table 47.-Summary of projected game fish stockings for small rural lakes in the UTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
15/5	Arctic Char	Subcatchable	5-6	8,725	
0/3	Coho Salmon	Fingerling	2-4		15,600
8/0	Arctic Grayling	Catchable	7-8	2,650	
20/6	Rainbow Trout	Fingerling	2-4	77,800	19,800
5/4	Rainbow Trout	Catchable	6-8	5,300	4,800
3/2	Rainbow Trout	Broodstock	12-16	75	50

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 2,477 to 10,158 angler-days and averaged about 5,810 angler-days (Table 48). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 23. Since 1990, 63% of the catch and 67% of the harvest of stocked game fish was made up of rainbow trout. Arctic grayling were next in significance by numbers of fish caught and harvested, Arctic char, Coho and chinook salmon (landlocked silvers and kings), and lake trout in decreasing order (Figure 24). Average annual effort per surface acre for stocked species is about 7.0 angler-days. The average catch rate (catch / effort) for stocked fish in rural lakes in the UTMA is about 2.8 fish per angler-day of effort (Table 49). The cost of producing and stocking fish (stocking cost) has ranged from about \$5,813 to \$45,434 while the cost-per-day of fishing (cost / effort) ranged from \$0.46 to \$4.20 (Table 49).

Upper Tanana Valley Remote Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game stocks remote lakes in the upper Tanana Valley to provide fishing opportunities for popular game species in locations where fishing opportunities don't exist or are limited. The remote lakes stocking program will serve a segment of the public who are willing to travel away from the road system to access lakes that are visited by few anglers. These lakes vary in size from 14 to 320 acres.

Generally, the remote lakes are stocked with fingerlings (2-4 inches) because smaller fish are easier and less expensive to transport than larger fish. Most stockings are done by aircraft or ATV. All of these lakes can produce sufficient numbers of catchable fish from fingerling stockings to sustain the existing fisheries. Because these lakes are more difficult to reach the level of effort and harvest is less than that for comparable size lakes near the road system. For this same reason these lakes generally have larger fish and more of them.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
Rainbow trout	10	No size limit
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 1,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Table 48.-Effort, harvest, and catch statistics by species for small rural lakes in the UTMA 1990-1999.

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort											
Number of Anglers ^a		2,088	2,312	2,211	2,903	2,600	3,466	2,418	1,998	1,243	1,634
Number of Days Fished (effort)		5,995	6,706	4,073	10,158	8,323	7,084	5,353	4,018	2,477	3,916
Catch											
Rainbow trout		15,583	8,189	6,792	15,464	10,250	10,018	8,760	9,512	7,102	5,528
Coho/Chinook salmon		406	605	260	1,480	1,620	672	193	215	2,465	1,452
Arctic Grayling		3,747	3,865	737	3,559	4,860	1,185	2,081	1,448	2,563	2,761
Arctic Char		737	3,326	975	3,055	1,779	1,220	1,523	807	513	341
Lake Trout		284	1,039	537	1,682	1,610	520	148	297	131	748
Total		20,756	17,023	9,301	25,241	20,119	13,615	12,704	12,278	12,774	10,830
Harvest											
Rainbow trout		7,288	3,008	3,390	4,086	3,063	3,862	3,729	2,723	2,952	1,384
Coho/Chinook salmon		68	420	130	1,029	984	277	0	120	1,180	515
Arctic Grayling		1,171	2,103	332	351	929	417	353	260	110	20
Arctic Char		112	1,874	152	933	511	516	403	337	206	35
Lake Trout		108	378	172	368	795	241	47	90	7	142
Total		8,747	7,783	4,176	6,767	6,281	5,313	4,532	3,529	4,455	2,097

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

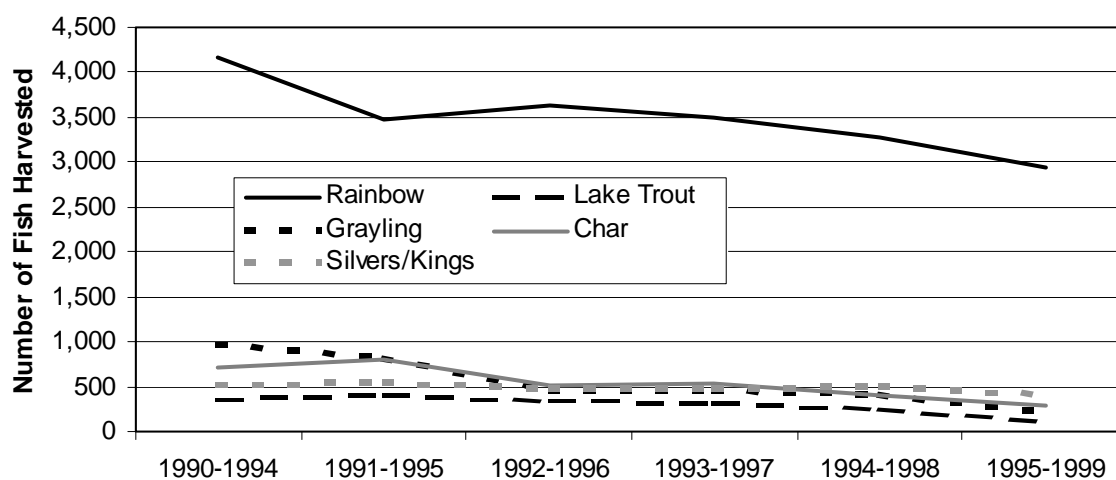
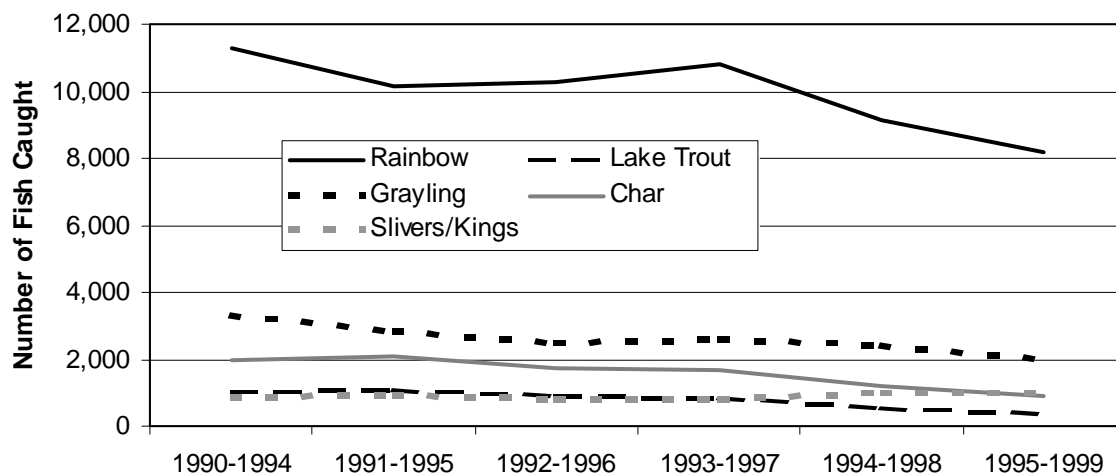
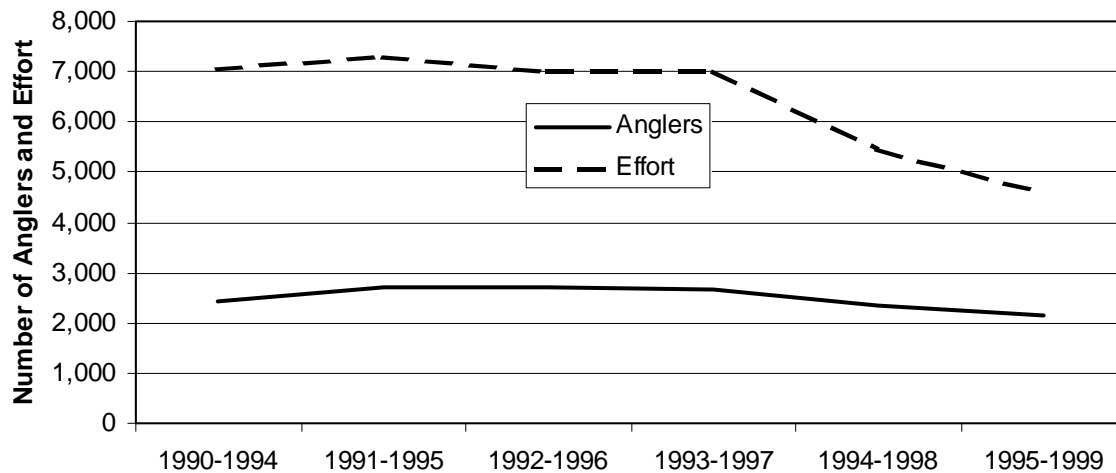
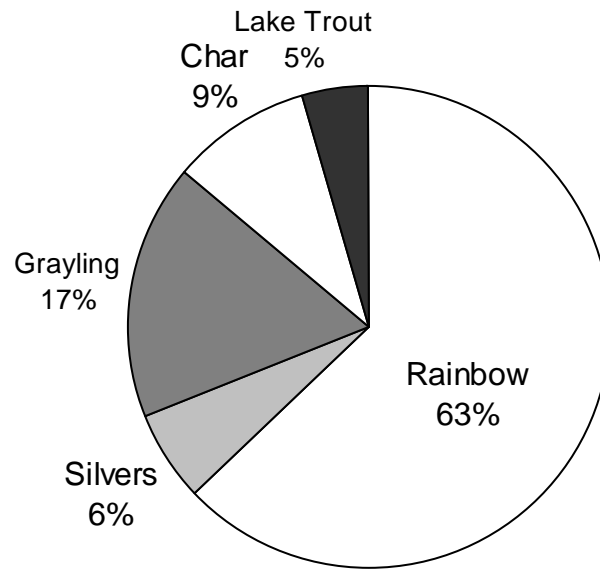


Figure 23.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from small rural lakes in the UTMA 1990-1999.

Catch



Harvest

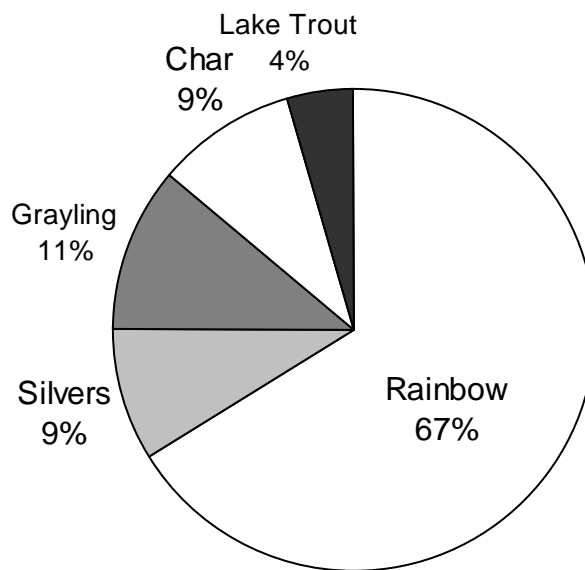


Figure 24.-Ten year average catch and harvest composition by species for small rural lakes in the UTMA, 1990-1999.

Table 49.-Summary of fishery statistics for small rural lakes in the UTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	5,995	6,706	4,073	10,158	8,323	7,084	5,353	4,018	2,477	3,916
Catch	20,756	17,023	9,301	25,241	20,119	13,615	12,704	12,278	12,774	10,830
Harvest	8,747	7,783	4,176	6,767	6,281	5,313	4,532	3,529	4,455	2,097
Catch rate (catch / effort)	3.5	2.5	2.3	2.5	2.4	1.9	2.4	3.1	5.2	2.8
Stocking cost						\$38,692	\$29,229	\$35,909	\$5,813	\$45,434
Cost-per-day of fishing						\$5.46	\$5.46	\$8.94	\$2.35	\$11.60
Cost-per-fish caught						\$2.84	\$2.30	\$2.92	\$0.46	\$4.20
Cost-per-fish harvested						\$7.28	\$6.45	\$10.18	\$1.30	\$21.67

Actions

Fish stockings for specific lakes are listed in Table 50. Fish stockings for 1999 and 2000 are summarized in Table 51 and projected fish stockings for 2001 and 2002 are summarized in Table 52.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 737 to 1,917 angler-days and averaged about 1,249 angler-days (Table 53). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 25. Since 1990, 99% of the catch and 99% of the harvest of stocked game fish was made up of rainbow trout. Lake trout contribute 1% to catch and harvest (Figure 26). Average annual effort per surface acre for stocked species is about 1.7 angler-days. The average catch rate (catch / effort) for stocked fish in remote lakes in the LTMA is about 2.3 fish per angler-day of effort (Table 54). The annual cost of producing and stocking fish (stocking cost) has ranged from about \$588 to \$3,667 while the annual cost-per-day of fishing (cost / effort) ranged from \$0.40 to \$4.00 (Table 54).

Table 50.-Actions for remote stocked lakes in the upper Tanana Valley.

Lake	Lake Size in Acres	Species	Stocking Years
Forest Lake	25	Rainbow Trout	Odd Years
Fourteen Mile Lake	90	Rainbow Trout	Odd Years
Monte Lake	90	Rainbow Trout	Odd Years
Koole Lake	320	Rainbow Trout	Odd Years
Rainbow Lake	96	Rainbow Trout	Odd Years
South Johnson Lake	14	Rainbow Trout	Odd Years
Square Lake	100	Rainbow Trout	Odd Years

Table 51.-Summary of stocking activities for small remote lakes in the UTMA 1998-2000.

Species	Catchable	Subcatchable	Fingerling	Total
1998				
Total	0	0	0	0
1999				
Rainbow Trout			27,500	27,500
Total			27,500	27,500
2000				
Lake Trout	500			
Rainbow Trout			9,000	9,500
Total	500		9,000	9,500

Table 52.-Summary of projected game fish stockings for small remote lakes in the UTMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
6/0	Rainbow Trout	Fingerling	2-4	40,500	0

Table 53.-Effort, harvest, and catch statistics by species for small remote lakes in the UTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	602	383	492	476	899	735	577	583	543	593
Number of Days Fished (effort)	1,487	911	737	1,033	1,917	1,855	1,458	1,096	815	1,183
Catch										
Rainbow trout	1,709	1,099	1,100	1,045	3,841	3,219	2,708	3,253	5,265	3,519
Lake Trout	0	0	0	0	59	0	0	0	0	137
Total	1,709	1,099	1,100	1,045	3,900	3,219	2,708	3,253	5,265	3,656
Harvest										
Rainbow trout	655	701	437	309	1,736	1,723	730	1,130	1,857	1,414
Lake Trout	0	0	0	0	15	0	0	0	0	55
Total	655	701	437	309	1,751	1,723	730	1,130	1,857	1,469

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

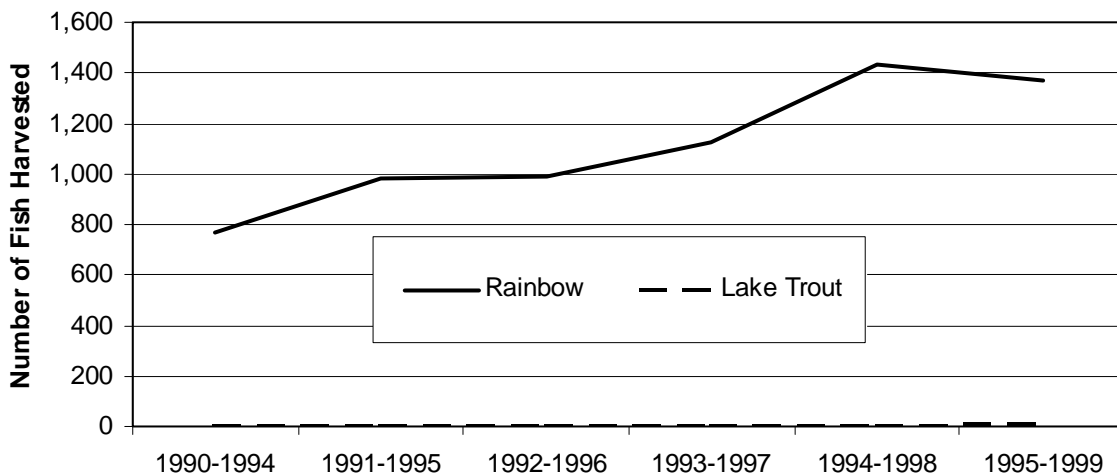
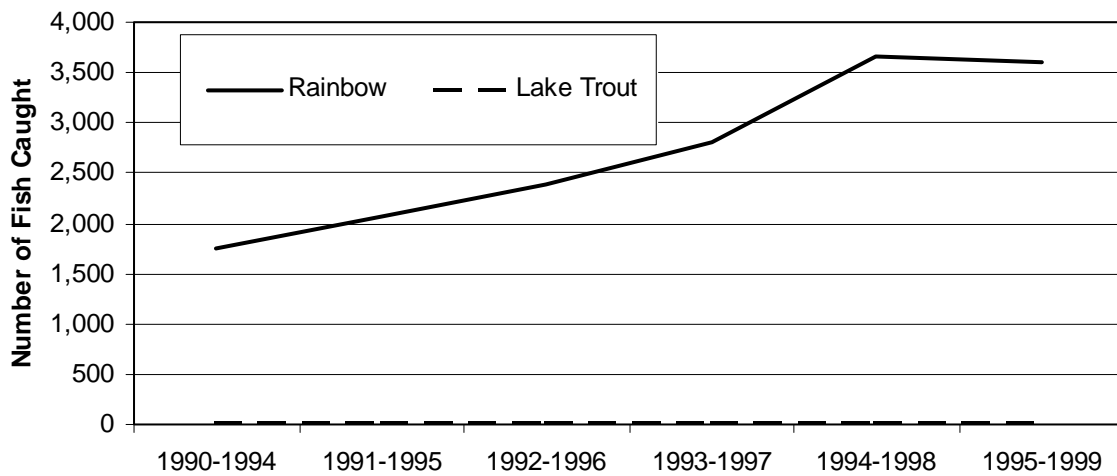
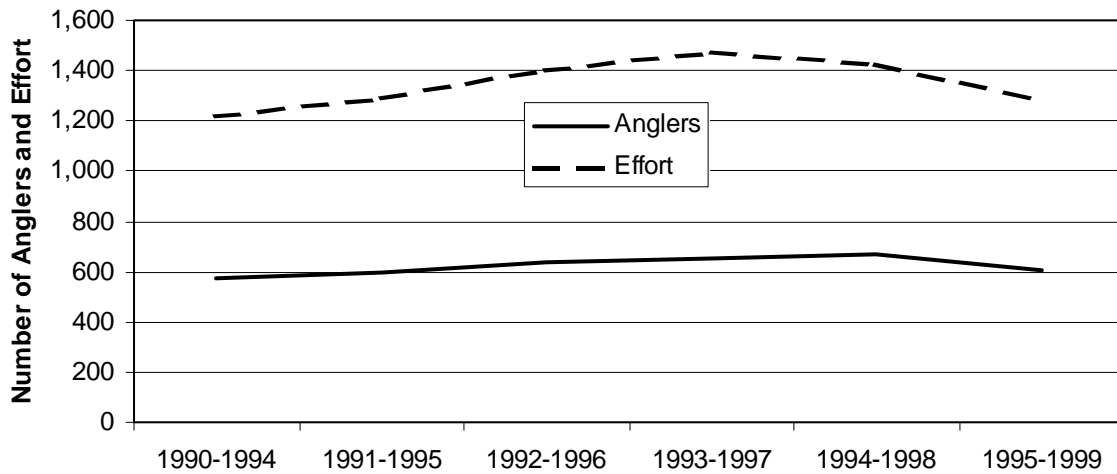
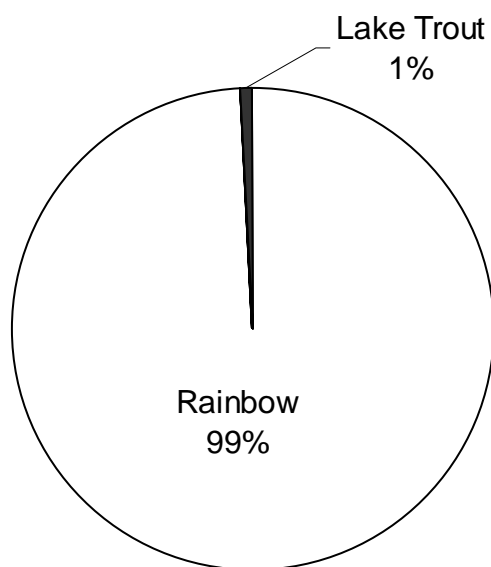


Figure 25.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from small remote lakes in the UTMA 1990-1999.

Catch



Harvest

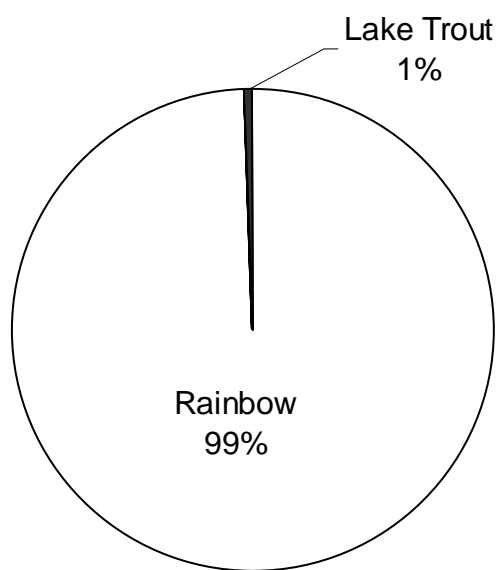


Figure 26.-Ten year average catch and harvest composition by species for small remote lakes in the UTMA, 1990-1999.

Table 54.-Summary of fishery statistics for small remote lakes in the UTMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	1,487	911	737	1,033	1,917	1,855	1,458	1,096	815	1,183
Catch	1,709	1,099	1,100	1,045	3,900	3,219	2,708	3,253	5,265	3,656
Harvest	655	701	437	309	1,751	1,723	730	1,130	1,857	1,469
Catch rate (catch / effort)	1.1	1.2	1.5	1.0	2.0	1.7	1.9	3.0	6.5	3.1
Stocking cost						\$3,081	\$588	\$3,667	\$3,260	\$3,667
Cost-per-day of fishing						\$1.66	\$0.40	\$3.35	\$4.00	\$3.10
Cost-per-fish caught						\$0.96	\$0.22	\$1.13	\$0.62	\$1.00
Cost-per-fish harvested						\$1.79	\$0.81	\$3.25	\$1.76	\$2.50

SECTION IV: UPPER COPPER / UPPER SUSITNA RIVER VALLEY SPORT FISHERY ENHANCEMENT

The Alaska Department of Fish and Game stocks about 30 lakes in the upper Susitna River drainage and the upper Copper River drainage management area (UCUSMA) to provide fishing opportunities for popular game species in locations where fishing opportunities don't exist or are limited. The lake stocking program will serve a segment of the public who want to fish but must remain on or near the road system. This program provides increased fishing opportunities and offers a diversity of species in urban and rural areas where minimal or no opportunities exist for sport fishing. It also diverts effort from wild populations in areas for which the department has conservation concerns. These lakes vary in size from 1.5 to 500 acres.

The ADF&G stocks fingerling size fish (2-4 inches) in some lakes and catchable size fish (6 to 12 inches) in other lakes. Most large lakes can produce sufficient numbers of catchables from stockings of fingerling to meet angler demand. Smaller lakes or the more popular large lakes are stocked with catchables because stockings of fingerlings can not provide sufficient numbers of catchables to meet angler demand. Catchables are stocked as soon as the ice is gone, helping to accommodate angler enthusiasm for spring fishing.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
Rainbow trout	10	Only 1 over 20 inches
Arctic grayling	10	No size limit
Silver salmon	10	Less than 16 inches
King salmon	10	Less than 20 inches
Arctic char	10	No size limit
Lake trout	2	No size limit

Objectives

1. Manage important endemic fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 5,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stockings for specific lakes are listed in Table 55. Fish stockings for 1999 and 2000 are summarized in Table 56 and projected fish stockings for 2001 and 2002 are summarized in Table 57.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Table 55.-Actions for remote stocked lakes in the UCUSMA.

Area (Access)Lake	Lake Size in Acres	Species	Stocking Years
Glenn Highway			
Arizona Lake	25	Grayling	Alternate
Buffalo Lake	4	Rainbow	Annual
DJ Lake	4	Rainbow	Alternate
Gergie Lake	60	Rainbow	Alternate
Little Junction Lake	5	Grayling	Alternate
Ryan Lake	45	Rainbow	Annual
Tex Smith Lake	15	Rainbow	Annual
Tolsona Lake	500	Rainbow	Annual
Richardson Highway			
Dick Lake	40	Char, Grayling	Alternate, Alternate
Meiers Lake	100	Grayling	Annual
Squirrel Creek Pit	5	Grayling, Rainbow	Annual, Annual
Lake Louise Road			
Caribou Lake	13	Grayling	Alternate
Connor Lake	18	Grayling	Alternate
Crater Lake	16	Rainbow	Alternate
Elbow Lake	6	Grayling	Alternate
Forgotten Lake	18	Grayling	Alternate
Junction Lake	18	Grayling	Alternate
Little Crater Lake	2	Rainbow	Alternate
Old Road Lake	1.5	Rainbow	Annual
Peanut Lake	12	Rainbow	Alternate
Round Lake	2	Rainbow	Annual
Edgerton Highway			
Three Mile Lake	20	Rainbow	Alternate
Two Mile Lake	17	Rainbow	Alternate
McCarthy Road			
Sculpin Lake	190	Rainbow	Annual
Silver Lake	500	Rainbow	Annual
Strelna Lake	290	Coho, Rainbow	Annual, Alternate
Van Lake		Rainbow	Alternate
Remote Lakes			
North Jans Lake	58	Rainbow	Alternate
South Jans Lake	100	Coho, Rainbow	Annual, Alternate
Tolsona Mt. Lake	75	Rainbow	Alternate

Table 56.-Summary of stocking activities for stocked lakes in the UCUSMA 1998-2000.

Species	Catchable	Subcatchable	Fingerling	Total
1998				
Arctic Char	1,000			1,000
Rainbow Trout	9,050	14,947		23,997
Coho/Chinook Salmon		34,907		34,907
Total	10,050	49,854		59,904
1999				
Arctic Grayling	512			512
Rainbow Trout	3,618	208,139	7,682	219,439
Coho/Chinook Salmon		53,428		53,428
Total	4,130	261,567	7,682	273,379
2000				
Arctic Char	1,521			1,521
Arctic Grayling	7,562			7,562
Rainbow Trout	7,179			7,179
Coho/Chinook Salmon		35,938		35,938
Total	16,262	35,938		52,200

Table 57.-Summary of projected game fish stockings for small remote lakes in the UCUSMA, 2001-2002.

Number of Lakes 2001/2002	Species	Lifestage	Target Size (in)	2001 Projected	2002 Projected
0/1	Arctic Char	Catchable	6-8	0	2,000
0/2	Coho Salmon	Fingerling	2-4	0	54,000
2/10	Arctic Grayling	Catchable	6-8	4,800	7,850
11/11	Rainbow Trout	Catchable	6-8	7,000	7,000
11/0	Rainbow Trout	Fingerling	2-4	171,000	0

Fishery Statistics

During 1990 - 1999, the total annual effort on stocked species ranged from 3,232 to 8,647 angler-days and averaged about 5,809 angler-days (Table 58). Five-year moving averages for number of anglers, effort, catch and harvest are shown in Figure 27. Since 1990, 64% of the catch and 76% of the harvest of stocked game fish was made up of rainbow trout. Arctic grayling and Silver/King salmon contribute 33% and 3% to catch and 21% and 3% to harvest, respectively (Figure 28). Average annual effort per surface acre for stocked species is about 2.7 angler-days. The average catch rate (catch / effort) for stocked fish in remote lakes in the UCUSMA is about 2.9 fish per angler-day of effort (Table 59). The annual cost of producing and stocking fish (stocking cost) has ranged from about \$8,222 to \$84,051 while the annual cost-per-day of fishing (cost / effort) ranged from \$1.95 to \$13.31 (Table 59).

Of all the stocked lakes in the UCUSMA, Silver Lake is the most popular. Since 1990, it accounted for about 33% of the anglers and effort generated on stocked waters. It also accounted for 42% of the catch and 35% of the harvest of all stocked fish.

SECTION V: STATE POLICIES AFFECTING LAKE STOCKING POLICY AND OTHER LAKE STOCKING

GENETIC AND DISEASE CONCERNS

Release of fish from hatcheries to lakes is governed by two complex policies. The genetic policy (Genetic Policy, Alaska Department of Fish and Game, 1985) was developed to protect the genetic integrity of wild and hatchery stocks. The disease policy (Regulation Changes, Policies and Guidelines for Alaska Fish and Shellfish Health and Disease Control, Alaska Department of Fish and Game, 1987) was developed to prevent the spread of fish diseases to wild and hatchery fish stocks.

The degree of genetic and pathology concern depends on the species of fish stocked and the category of lake. There are no genetic or disease concerns with the stocking of any species of fish in a category 1 (landlocked) lake. The fish cannot escape the lake and cause problems with wild fish populations. Also, there is no outlet to transport water borne pathogens.

There are however, both genetic and disease concerns with stocking fish in category 2 (intermittent outlet), 3 (weir or barrier outlet), and 4 (flood prone) lakes. Whenever stocked fish escape the lake of origin, genetic mixing with wild stocks of fish and the spread of pathogens could occur.

Category 5 (open outlet) lakes produce severe genetic and disease concerns. Fish can enter and leave most open outlet systems at will. Interaction with wild stocks of fish is probable. Stocking fish in lakes with open outlets is generally not acceptable from either a genetics or disease perspective. However, select circumstances exist at some lakes that ameliorate genetic and disease concerns.

MANAGEMENT CONCERNS

Management concerns associated with stocked lakes are minimal. No commercial fisheries are involved and there are no conservation concerns with stocked fish. Sport anglers are the sole harvesters of the Sport Fish Division lake stocking program. Some lake stocking projects may require a change in area sport fishing regulations. Most area regulations are conservative in order to preserve wild stocks of resident fish. Regulations on stocked lakes are generally more

Table 58.-Effort, harvest, and catch statistics by species for stocked lakes in the UCUSMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Effort										
Number of Anglers ^a	3,078	3,716	5,758	3,956	4,053	3,893	3,290	2,395	3,006	2,184
Number of Days Fished (effort)	3,751	5,035	8,647	6,161	7,945	8,122	6,316	3,232	4,216	4,666
Catch										
Rainbow trout	6,810	10,772	21,910	17,418	14,814	11,058	8,043	8,144	11,781	5,529
Coho Salmon	51	389	670	56	550	109	611	607	1,593	333
Lake Trout	5,502	2,136	5,764	6,735	9,182	8,569	6,394	6,444	3,260	6,254
Total	12,363	13,297	28,344	24,209	24,546	19,736	15,048	15,195	16,634	12,116
Harvest										
Rainbow trout	2,700	6,308	8,723	6,795	5,109	4,355	3,947	2,512	4,942	3,370
Coho Salmon	17	111	433	56	134	42	225	315	412	249
Lake Trout	1,393	794	1,969	1,186	2,324	1,429	971	1,405	489	1,521
Total	4,110	7,213	11,125	8,037	7,567	5,826	5,143	4,232	5,843	5,140

^a Estimates of the numbers of anglers in this table are inflated because some anglers fish at more than one location. As a result, they are counted more than once.

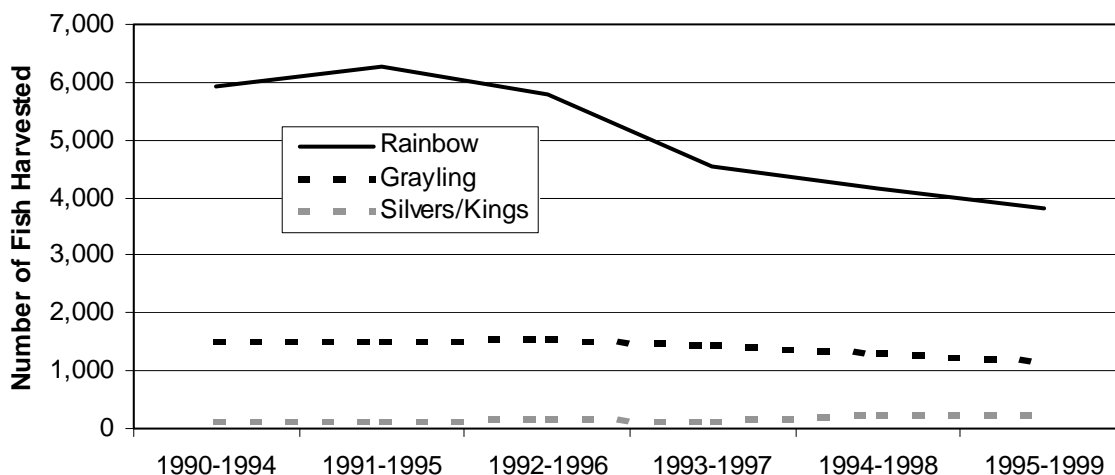
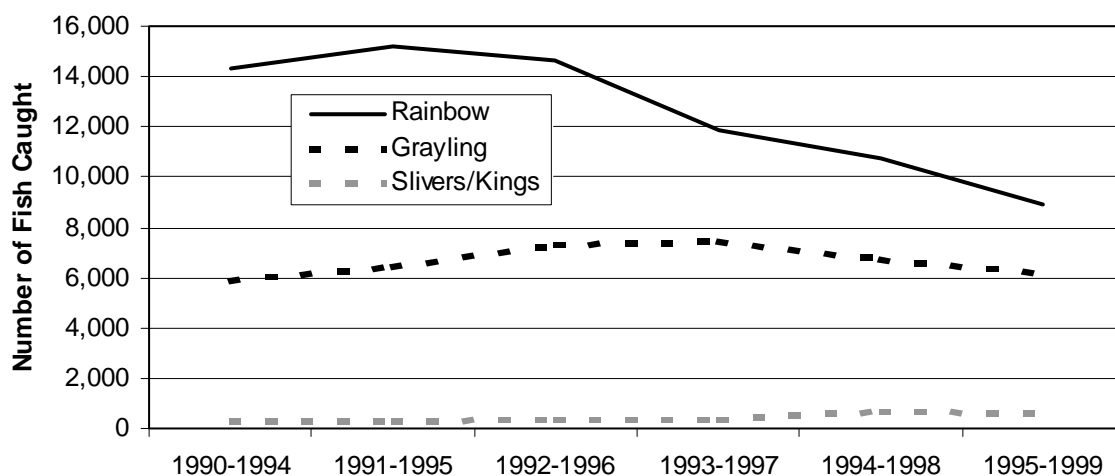
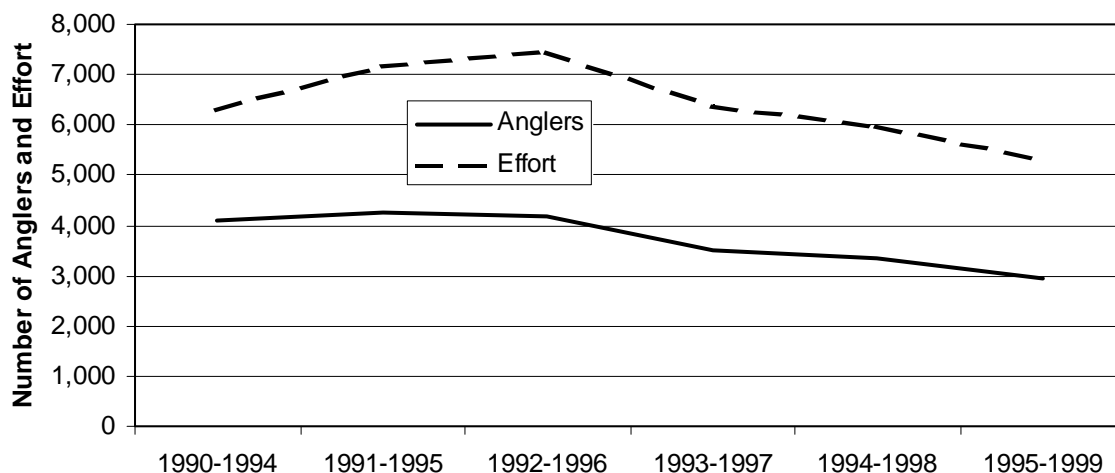
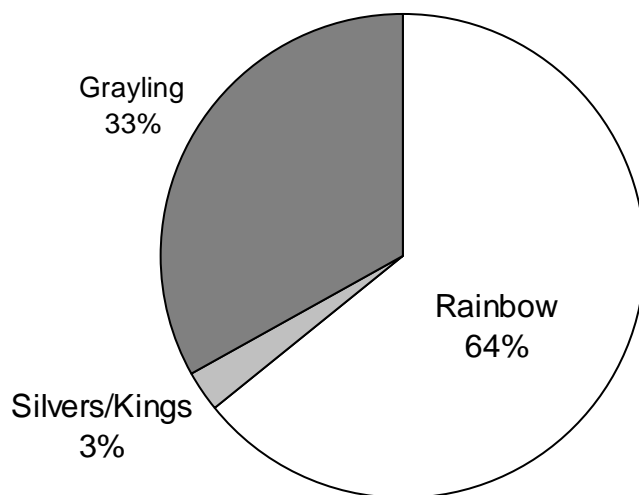


Figure 27.-Five-year moving averages for fishing effort (angler-days) and number of fish caught and harvested from stocked lakes in the UCUSMA 1990-1999.

Catch



Harvest

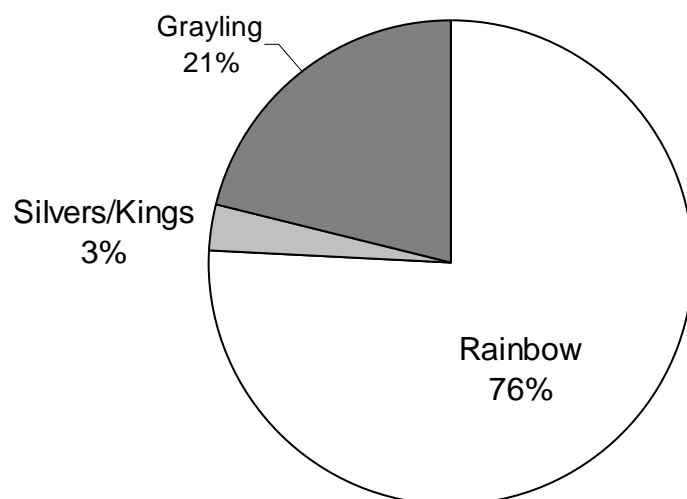


Figure 28.-Ten year average catch and harvest composition by species for all stocked lakes in the UCUSMA, 1990-1999.

Table 59.-Summary of fishery statistics for stocked lakes in the UCUSMA 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Days fished (effort)	3,751	5,035	8,647	6,161	7,945	8,122	6,316	3,232	4,216	4,666
Catch	12,363	13,297	28,344	24,209	24,546	19,736	15,048	15,195	16,634	12,116
Harvest	4,110	7,213	11,125	8,037	7,567	5,826	5,143	4,232	5,843	5,140
Catch rate (catch / effort)	3.3	2.6	3.3	3.9	3.1	2.4	2.4	4.7	3.9	2.6
Stocking cost						\$43,871	\$84,051	\$27,185	\$8,222	\$17,305
Cost-per-day of fishing						\$5.40	\$13.31	\$8.41	\$1.95	\$3.71
Cost-per-fish caught						\$2.22	\$5.59	\$1.79	\$0.49	\$1.43
Cost-per-fish harvested						\$7.53	\$16.34	\$6.42	\$1.41	\$3.37

liberal. Sport anglers are encouraged to harvest hatchery produced fish and preserve wild stocks of fish. Sport Fish Division will attempt to maintain liberal harvest limits on all stocked lakes.

Other management issues associated with lake stocking are public access and the sale of fish. Production of all hatchery fish is paid for with funds collected from sport anglers. Consequently, no fish should be stocked unless the public has access to catch the fish. Sport Fish Division will not stock fish in a lake unless there is legally designated public access. In addition, Sport Fish Division hatchery produced fish may not be sold to private individuals since the fish were produced with public funds.

STOCKING GUIDELINES

Category 1 lakes can be stocked with any hatchery product (Table 60). Both types of rainbow trout, Arctic grayling, landlocked salmon, Arctic char, or lake trout are acceptable for stocking. There are no genetic or disease concerns.

Category 2, 3 and 4 lakes can be stocked with all-female triploid rainbow trout. These fish are sterile and cannot interbreed with wild stocks of rainbow trout. All fish for stocking of Category 2, 3 and 4 lakes must be disease free at the time of stocking.

Category 2 and 3 lakes may only be stocked with local brood stocks of Arctic grayling and landlocked salmon if native populations of these species are present the drainage. Escaping the lake and mixing with native fish will have minimal genetic impact. Some Category 2 and 3 lakes may be stocked with lake trout. The life history of this fish makes it highly unlikely that lake trout will escape the lake, establish a naturally reproducing population and compete with native fish.

Category 4 lakes cannot be stocked with landlocked salmon or Arctic char. However, Category 4 lakes may be stocked with grayling or lake trout if the brood stock is indigenous to the drainage.

Category 5 lakes should not be stocked except under special circumstances. All-female triploid rainbow trout may be stocked into systems that do not contain native rainbow trout. Reproduction will not occur. Any stocking in a Category 5 system should be solely for the purpose of creating a significant fishery for species not readily available in the area. All stocking products for Category 5 lakes must be disease free at the time of stocking.

SECTION VI: STOCKING STRATEGY AND PRODUCTS

STRATEGY

The stocking strategy in Region III (Sport Fish Division) is to stock species most suited to a particular lake's physical characteristics and at a size to account for lake productivity and harvest pressure. Rainbow trout and Arctic grayling do well in most lakes and support summer fisheries. Coho salmon also do well in most lakes and provide an aggressive fish during winter when other species are less active. Arctic char and lake trout are long lived and grow to large size that make them attractive to anglers. In some lakes more than one species are stocked to provide diversity and to take advantage of different seasonal behavior. Rainbow trout and coho salmon are the most popular combination.

The state hatcheries provide different size fish from sac-fry (1 inch) to catchables (6-10 inches), and even excess brood stock fish (12-18 inches). Because lakes have different capabilities for

Table 60.-Classification of lakes and recommended stocking products for Sport Fish Division lake stocking projects.

Lake Type ^a	FTP Grouping Category ^b	Rainbow Trout ^c					
		Mixed-Sex	All-Female Triploid	Arctic Grayling	Landlocked Salmon	Arctic Char	Lake Trout
Landlocked	1	Yes	Yes	Yes	Yes	Yes	Yes
Connected Lakes	1	Yes	Yes	Yes	Yes	Yes	Yes
Intermittent Outlet	2	No	Yes	Maybe ^d	Maybe ^d	No	Maybe ^e
Weir	3	No	Yes	Maybe ^d	Maybe ^d	Maybe ^e	Maybe ^e
Barrier Outlet	3	No	Yes	Maybe ^d	Maybe ^d	Maybe ^e	Maybe ^e
Flood Prone	4	No	Yes	Maybe ^d	No	No	No
Open Outlet	5	No	No	No	No	No	No

^{a, b, c} See Table 61 for definition of terms.

^d If a wild population of a species is present in the drainage, only strains of fish indigenous to the drainage maybe stocked. If there are no wild populations of this species, it may be stocked if there is no possibility of the stocked fish creating a naturally population.

^e The life history of this fish makes it highly unlikely that fish will escape the lake, establish a naturally reproducing population and compete with native fishes.

Table 61.-Definition of terms used for lake classification and stocking products.

Lake Type	Definition
Landlocked	There is no outlet; fish cannot escape lake.
Connected Lakes	Two or more lakes connected by streams, but no outlet for lowest lake in the drainage. Fish cannot escape lowest lake.
Intermittent Outlet	Lake is usually landlocked, but fish can escape if high water flows occur.
Weir	Outlet stream is blocked by man-made structure. Fish cannot escape unless weir fails or is compromised.
Barrier Outlet	Outlet stream is blocked by natural structure. Fish cannot usually pass through the barrier and survive.
Flood Prone	Lake is landlocked, but is subject to flooding during high water periods. Fish can escape during floods.
Open Outlet	Lake has outlet stream and fish can move into and out of lake.

Lake Category	Definition
Category 1	Lakes are truly landlocked and fish cannot exit the system. There is no interaction with any wild fish populations except those indigenous to the lake. No restrictions on fish stocking.
Category 2	Lakes with an intermittent outlet. Snow melt during heavy snow years may fill lake basin and create a small outlet stream. Fish may periodically escape from a Category 2 lake and compete with wild fish populations. However, the incidence of stocked fish escapement is low. The danger to wild fish populations is also low. Moderate restrictions on fish stocking.
Category 3	Includes weired lakes and lakes with barriered outlets. Fish may periodically escape from a category 3 lake and compete with wild fish populations. However, the incidence of stocked fish escapement is low. The danger to wild fish populations is also low. The primary concern is the passage of pathogens from stocked fish to wild fish. Moderate restrictions on fish stocking.
Category 4	Lakes are flood prone lakes. These are small lakes or ponds usually located in the floodplain of a stream and subject to flooding during high stream water flows. Fish can leave the system during flood periods. Moderate to severe restrictions on fish stocking.
Category 5	Lakes with open outlets. Fish are free to pass in and out of the system at will. Stocking not recommended. Stocking may occur under severe restrictions.

Rainbow Trout Population	Definition
Mixed-Sex	These are normal fish that are capable of reproduction.
All-Female Triploid	These fish have been genetically altered so that all the fish are females, sterile, and cannot reproduce.
Miscellaneous Terms	
Drainage	All of the waters comprising a watershed, including tributary rivers, streams, sloughs, ponds and lakes which contribute to the supply of the watershed.

producing catchable fish, ADF&G requests different size fish to meet certain stocking objectives. Fingerling rainbow trout and coho salmon are stocked in Quartz Lake because the lake produces sufficient numbers of catchable fish from fingerling stockings. In small roadside lakes like Little Lost Lake, Rich 81, and J Lake, ADF&G stocks catchable rainbow trout and Arctic grayling. These lakes are small and received a lot of fishing pressure relative to their size. As a result, they can't produce sufficient numbers of catchable fish (from stockings of fingerlings) to meet angler demand. The department also stocks some of the high use lakes early in the spring and again one or more times during the summer to provide sufficient numbers of fish throughout the year. Prior to altering the stocking strategy, anglers were expressing frustration with these fisheries because by spring there were too few large fish.

The ADF&G generally stocks the remote and larger rural lakes with fingerlings because smaller fish are easier and less expensive to transport than larger fish. All of these lakes produce sufficient numbers of catchable fish from fingerling stockings to sustain the existing fisheries. Because these lakes are more difficult to reach, the level of effort and harvest is less than that for comparable size lakes near the road system. Generally, these lakes produce larger fish and more of them for the same reasons.

Recently the department started stocking catchable rainbow trout in lakes that don't usually support fish through winter. By stocking such lakes with catchable size fish ADF&G has created instant and popular fisheries. The department's goal is to stock only enough fish to support the spring and summer fishing season because any fish left in the lake may not survive the winter. This recent change to the stocking program has increased the number of lakes that can be stocked and increased angler opportunity.

PRODUCTS

The state fish hatcheries at Ft. Richardson and Elmendorf Air Force Base near Anchorage produce rainbow trout, Arctic grayling, Arctic char, coho (silver) and chinook (king) salmon, and lake trout. All species are stocked in Region III. Fish are transported by truck to the stocking location or they are transferred to off road vehicles or aircraft for transport to more remote locations.

Rainbow Trout

Rainbow trout is the primary hatchery product used in lake stocking. All rainbow trout are from a captive brood stock maintained at Fort Richardson Hatchery. The brood stock is descended from wild Swanson River rainbow trout. The stocking program uses two types of rainbow trout: 1) mixed sex diploid fish that are normal fish capable of reproduction; and 2) all-female triploid fish that are female fish not capable of reproduction.

The department generally stocks three sizes of rainbow trout. Catchable rainbow trout are 1 year old and are about 6 to 10 inches. Sub-catchable rainbow trout are 6 months to 1 year old and are 4 to 6 inches. Fingerling rainbow trout are usually 2 to 4 months old and are 2 to 3 inches. Rainbow trout fry are less than 2 months old and are 1 to 1 ½ inches.

Arctic Grayling

All stocked Arctic grayling are from eggs taken from two wild stocks (Tanana River and Moose Lake-Gulkana River). Both fish stocks have been used in the LTMA and UTMA but currently only the Tanana River stock is used in the Tanana River drainage. Only the Moose Lake stock is used in the UCUSMA. No captive brood stock is maintained in the hatchery. The department

produces four sizes of Arctic grayling for stocking. Catchable Arctic grayling are 1 year old and are 6 to 9 inches. Subcatchable Arctic grayling are 6 months to 1 year old and are 3 to 5 inches. Fingerling Arctic grayling are usually 2 to 4 months old and are 2 to 3 inches. Arctic grayling fry are less than 2 months old and are about 1 inch. Arctic grayling sac-fry are newly hatched and are about 1/2 inch.

Arctic Char

All stocked Arctic char are from eggs taken from a wild stock of fish. The brood stock currently used is from the Bristol Bay Area. No captive brood stock is maintained in the hatchery. Due to the difficulty of conducting a wild egg-take and the longevity of this species, eggs are only taken every other year. Generally we stock three sizes of Arctic char. Catchable Arctic char are 1 ½ years old and are 6 to 10 inches. Subcatchable Arctic char are 6 months old and are 5 to 7 inches. Fingerling Arctic char are usually 4 to 6 months old and are 4 to 5 inches.

Coho Salmon

All coho salmon used for lake stocking are from eggs taken from hatchery-produced adults. The broodstock may vary depending on availability. Two sizes of coho salmon are stocked. Subcatchable coho salmon are 1 year old and are 4 to 6 inches. Fingerling coho salmon are 2 to 4 months old and are 2 to 4 inches.

Chinook Salmon

All hatchery chinook salmon used for lake stocking are from eggs taken from hatchery produced adults. The broodstock used may vary depending on availability. Two sizes of chinook salmon are stocked. Catchable chinook salmon are 1 year old and are 6 to 8 inches. Subcatchable chinook salmon are 6 to 8 months old and are 4 to 5 inches.

Lake Trout

All lake trout from the hatcheries are from eggs taken from wild stocks. The brood stock currently used is from Seven-mile Lake (Yukon River drainage) near Paxson. No captive brood stock is maintained in the hatchery. Due to the difficulty of conducting a wild egg-take and the longevity of this species, eggs are only taken every other year. Two sizes of lake trout are stocked. Catchable lake trout are 1 ½ years old and are 5 to 7 inches. Fingerling lake trout are usually 4 to 6 months old and are 4 to 6 inches.

SECTION VII: HATCHERY REVIEWS 1999-2000

ARCTIC CHAR - 1999

Stocking Summary

Arctic char have been stocked in Region III since 1986. Most stockings are in small lakes (<60 acres) along the road system. The ADF&G has stocked fish from 2 to 24 inches. The range in size reflects the hatchery experimenting with culture methods to increase size.

Currently, 25 lakes are stocked with 80,075 subcatchable and 5,150 catchable Arctic char. Subcatchable and catchable fish are stocked on alternate years. The majority of the fish are stocked in Birch, Quartz, Chena and Harding lakes.

Generally, catchables are stocked in small lakes in high use urban areas and subcatchables in rural or remote lakes. The small urban lakes are popular fisheries but they cannot produce sufficient numbers of catchable fish from stocked subcatchables to meet angler demand.

The department has recently changed from stocking a large number of fingerling to stocking fewer subcatchable Arctic char. This action will reduce the number of eggs that must be taken from the population at Lake Aleknagik.

Program Mission

Stock a long lived species that has the potential for attaining large size.

Stock a species that is not commonly found along the road system.

Provide an acceptable fishery for an acceptable cost.

Program Goals

Conservation of wild stocks of sport fish:

Divert fishing pressure from wild populations where ADF&G may have conservation concerns, to stocked populations with no conservation problems. Arctic char are unique in the interior and Glennallen areas. Unique opportunities attract anglers.

Provide a diversity of recreational fishing opportunities:

The stocking program provides a unique opportunity for a large number of anglers near population centers. These are long lived fish that attain large size and are not found in roadside lakes. If not for the stocking program most resident and non-resident anglers would not have an affordable opportunity to fish for Arctic char.

Optimize social and economic benefits from recreational fisheries:

An economic survey (1996) of the five major stocked waters in the Tanana valley estimated the net economic value at \$4 million (SE = 0.27 million). Although the contribution of Arctic char could not be separated from other stocked species, the net economic value of the stocking program exceeded the cost for these major fisheries (\$317,150) in 1996.

Objectives

Provide for an annual harvest of 3,000 and a catch of 8,000 Arctic char.

Maintain a five year average cost/benefit less than \$8/catch.

Past Evaluation Work

When the program started the department did not know much about culture or stocking Arctic char. While hatchery staff were developing culture methods research biologists were also conducting field trials. Most stocking evaluation work was set up to evaluate growth and survival of Arctic char when stocked in small lakes with other stocked species.

The department found that Arctic char did well in most lakes except when stocked in shallow low elevation lakes. High temperatures and lack of a cool refuge seemed to be the best predictor of unsuccessful stockings.

The department hypothesized that multiple species stocked in the same lake would partition and make more efficient use of habitat which would result in more fish available to anglers. Arctic char in combination with other stocked species did not increase overall fish production as hoped.

The department wanted to know what size of fish to stock in Harding Lake that would give the best return to the creel for a reasonable cost. Catchables were not a consideration because hatchery raceway space was limited. A review of past stockings and catches in nets

and with sport gear suggested that a subcatchable (3 to 5 inches) would give the best return to the creel and would free up space in the hatchery.

Catch and Harvest Summary

Since 1990, annual catch has fluctuated from about 3,600 to more than 11,000 fish. The five year moving average is between 7,000 and 8,000 fish. Harvest over the same period has ranged from less than 900 to almost 4,800 fish. The recent five year moving average is about 2,600 fish.

PROGRAM COST

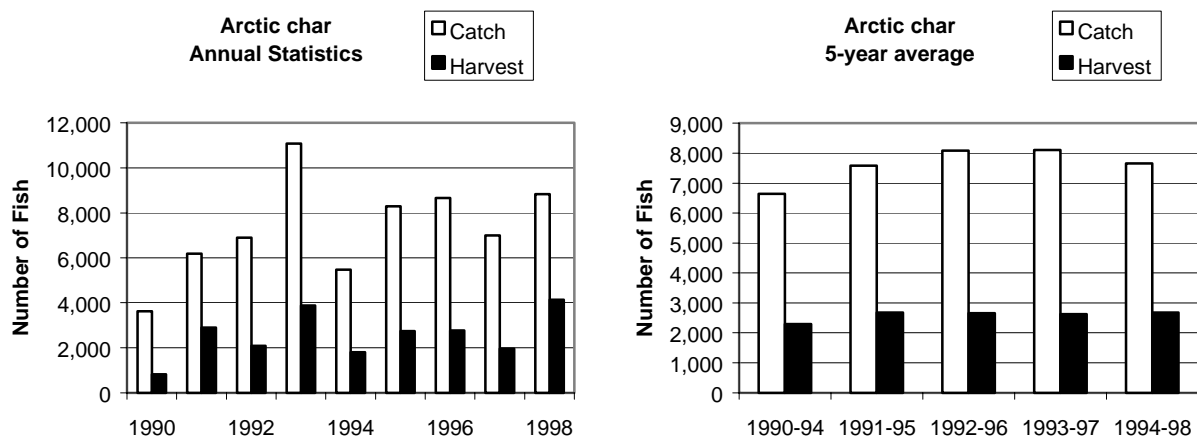
Combined production and stocking costs in 1998 was \$37,000 including stocking assistance and the egg take at Lake Aleknagik (\$15,500). In 1998 there were no management or research projects specifically targeting Arctic char. About \$8,700 of the stocking program budget was tied to overhead costs for running the Arctic char program. The total cost of the Arctic char program in Region III was \$45,700.

Performance Related to Goals and Objectives

Angler Expectation

Anglers are becoming more aware of the Arctic char program because the fish have had time to attain large size and anglers have also learned methods to catch these fish. The opportunity to catch fish that are 12 pounds or larger along the road system is a unique and popular attraction. Anglers are now interested in being the one to catch the new state record for Arctic char. The department expects the Arctic char program will become more popular now that anglers are aware of the potential.

In the Coal Mine Road lakes department staff have captured Arctic char in the 14 to 18 inches range. Anglers report catching Arctic char 18 inches and larger in Quartz Lake and 12 to 18



inches in Birch Lake. In Harding Lake department staff captured Arctic char up to 31 inches. Fish captured in fall 1998 measured 22 to 30 inches and 11 to 16.5 pounds.

Initially, there was little return from the Arctic char program. But now that the fish have lived long enough to attain large size, an increasing number of anglers are targeting the species and consider the possibility of catching a large fish an added bonus to other stocked game fish.

In Region III, department staff has ranked the Arctic char program behind rainbow trout but ahead of silver and king salmon, lake trout, and Arctic grayling. From talking with anglers the

department's impression is that they will accept a higher cost in order to keep the ability to catch a large fish along the road system.

Eggtake Cost for Aleknagik Arctic Char

The eggtake in 1998 cost \$15,500. About \$13,000 was salary for two FW technicians. The eggtake occurs every two years and represents about ¼ of the Hatchery Support budget over two years.

Other Eggtake Options

Harding Lake. Staff will capture Arctic char at Harding Lake and transport them to a gravel pit near the Fairbanks office. The fish will be held in net pens until they ripen. After the eggtake the fish will be transported back to Harding Lake.

Brood Stock at Ft. Richardson. Having broodstock at the hatchery will reduce costs of wild eggtakes, reduce impact to the wild population, and increase probability of meeting egg goals. However, an Arctic char brood stock may not be an option at this time due to insufficient water supply and poor water quality.

Recommendations

Continue the Arctic char program but investigate the possibility of obtaining eggs from Harding Lake and other ways to utilize technician time at Aleknagik.

Conduct eggtake at Aleknagik in 2000 and conduct eggtake at Harding Lake. This action will ensure that the necessary number of eggs will be obtained for the program. The additional cost of an eggtake at Harding Lake will be about \$4,000 and includes technician time, equipment, and material.

Reduce cost of technicians at Aleknagik by sharing them with other projects.

Increase the production of catchable Arctic char and decrease subcatchable and fingerling production.

CHINOOK SALMON – 1999

Stocking Summary

Chinook salmon have been stocked in Region III since 1978. ADF&G has stocked fish from 2 to 10 inches in about 23 lakes in the Fairbanks, Delta, and Glennallen areas.

Currently, the department stocks eight lakes along the road system in only the Fairbanks area with 31,300 catchable chinook salmon. All of these lakes are classified as high use urban. More than half of the fish are stocked in Chena Lake.

Program Mission

Stock an aggressive species that will support a winter fishery in high use urban lakes.

Provide an acceptable fishery for an acceptable cost.

Program Goals

Conservation of wild stocks of sport fish:

Divert fishing pressure from wild populations where we may have conservation concerns to stocked populations with no conservation problems. During winter local wild populations can be over fished. Easily reached, stocked chinook salmon can provide an alternative to wild populations that are more difficult to reach.

Provide a diversity of recreational fishing opportunities:

The stocking program provides a unique opportunity for a large number of anglers near population centers. An aggressive fish will provide interesting winter time fishing and attract anglers to local fisheries along the road system. During winter, anglers who don't have access to snow machines or aircraft to reach remote lakes and streams can find enjoyable fishing along the road system.

Optimize social and economic benefits from recreational fisheries:

An economic survey (1996) of the five major stocked waters in the Tanana valley estimated the net economic value at \$4 million (SE = 0.27 million). Although we were not able to separate the contribution of Chinook salmon from other stocked species, the net economic value of the stocking program exceeded the cost for these major fisheries (\$317,150) in 1996.

Objectives

It is difficult for anglers to distinguish between lake chinook and coho salmon. Statistics reported in the Statewide Harvest Survey for lake silvers probably include chinook salmon. Catch and harvest benefits for lake chinook salmon cannot therefore, be directly determined.

Stock 31,000 catchable chinook salmon (6 to 8 inches) in Fairbanks urban lakes and 10,000 in Quartz Lake.

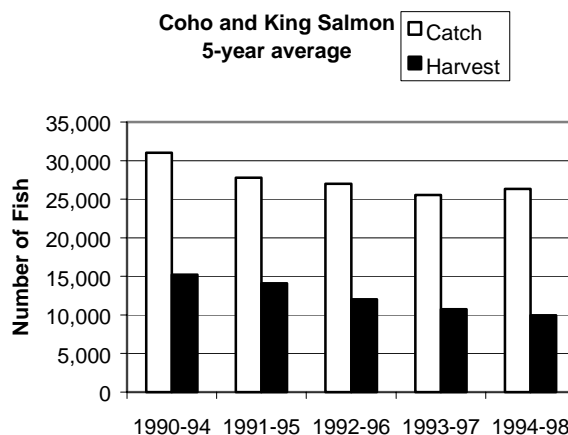
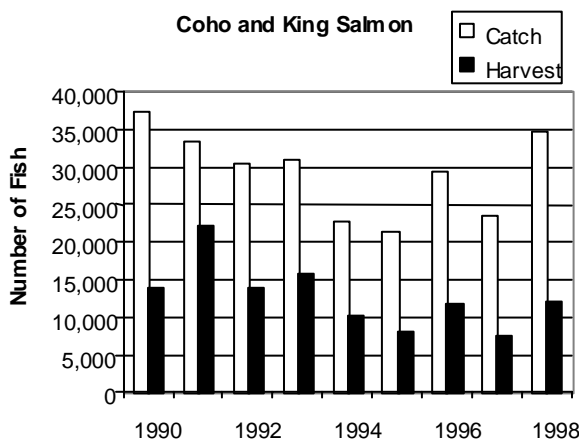
Past Evaluation Work

In Little Harding Lake and Bolio Lake, survival to age 1 for fish stocked as fingerlings was about 30% while survival to age 2 was about 4%. Because of poor survival compared to coho salmon (over 50%), the department stopped stocking chinook salmon. In later sampling, fish up to 18 inches were captured in Little Harding Lake.

Because the hatcheries can now produce catchable (6 to 8 inches) chinook salmon, the department can now provide put and take fisheries. Most of our information about the king's aggressive behavior comes from talking with anglers during catch sampling and observations by department staff. Anglers, especially kids, like the fast action. The department now stocks only enough kings to provide a winter put and take fishery.

Catch and Harvest Summary

Since 1990, the annual catch of coho and king salmon has fluctuated from about 22,000 to more than 37,000 fish. The five year moving average is between 26,000 and 32,000 fish. Harvest



over the same period has ranged from less than 8,000 to almost 23,000 fish. The recent five year moving average is about 10,000 fish.

Program Cost

Combined production and stocking costs in 1998 was \$74,600. In 1998 there were no management or research projects specifically targeting chinook salmon. The hatcheries do not require any assistance from Region III for stocking because all lakes are on the road system and are easily accessed by the hatchery trucks. Overhead cost of the chinook salmon program in Region III is minimal.

Performance Related to Goals and Objectives

Catchable chinook salmon are stocked in urban lakes because these lakes can not produce sufficient numbers of catchable fish from fingerling stockings to meet angler demand. Catchable chinook are aggressive and provide high catch rates during winter, compared to other stocked and wild game fish. Department staff has ranked chinook salmon fourth in popularity behind rainbow trout, Arctic char, and lake trout; but ahead of coho salmon and Arctic grayling.

Recommendations

Continue the catchable chinook salmon program but create a sterile version that can be stock in additional lakes.

Expand catchable program to the Upper Tanana River Management Area.

RAINBOW TROUT - 2000

Stocking History

Rainbow trout have been stocked in Region III since 1939 when fish were stocked into Harding Lake. During the early 1950's, lakes in Interior Alaska were rehabilitated in efforts to remove northern pike, which were not a desired sport or subsistence fish. Rainbow trout were selected for stocking because anglers desired them and fishery managers thought they would do well in Interior Alaska. Many Alaska and non-Alaska strains of rainbow trout have been introduced into Region III lakes. They include Ennis, Montana; Kamloops, British Columbia; Winthrop Washington; Willamette, Oregon; Roaring River, Oregon; an Alaska/Ennis strain, as well as Naknek River, Talarik Creek, Crooked Creek, Swanson River, and Big Lake brood sources. After many survival and growth studies with various strains during the 1970's, and the adoption of genetics and pathology policies, Swanson River stain was eventually selected for the fish stocking program.

Early field evaluations showed that survival to catchable size increased as the size of the fish at the time of stocking rainbow trout also increased. Larger fish, however, cost more to produce and their better survival did not always justify their higher cost. Initially, subcatchable rainbow trout were stocked into lakes supporting major stocked waters fisheries during the late 1980's and 1990's because survival to catchable size in these lakes was better compared to that for fish stocked as fingerlings. Also, the cost to catchable size was often less for fish stocked as subcatchables. Eventually the hatcheries began producing catchable size rainbow trout and the production of subcatchables was dropped to provide additional space in the hatchery for catchable production. Catchable fish are used when a lake cannot produce sufficient numbers of catchable fish from fingerling stockings to meet angler demand. Currently, the hatcheries produce only fingerlings, catchables, and broodstock for stocking.

The Region III stocking program has evolved to become fishery-specific, where the size of the fish at the time of stocking is matched with fishing pressure (angler effort per lake surface area), harvest, and lake productivity. In general, most fisheries in Region III are managed for either put-and-take or put-and-grow. Catchable rainbow trout and surplus broodstock are used in put-and-take fisheries, where lake characteristics and angling pressure do not allow for growth of small fish to catchable size. Typically, urban lakes and heavy use rural lakes put-and-take fisheries are managed as put-and-take fisheries. Remote lakes and less used rural lakes are managed as put-and-grow fisheries. Fingerlings are stocked in these lakes.

Program Mission

Provide a diversity of sport fishing opportunities.

Stock a species that is sought after by anglers.

Provide an acceptable fishery for an acceptable cost.

Program Goals

Conservation of wild stocks of sport fish:

Divert fishing pressure from wild populations where we may have conservation concerns to stocked populations with no conservation problems.

Provide a diversity of recreational fishing opportunities:

The stocking program provides a unique opportunity for a large number of anglers near population centers. Rainbow trout are not indigenous to Interior Alaska but they are the most requested species. Recently, anglers have expressed interest in having ADF&G provide for fisheries that have quality (trophy or large size) rainbow trout. To accommodate anglers, the stocking program is expanding to not only provide species diversity but also diversity of angling experience.

Stock appropriate size, number, and type of fish according to fishery

Fishery specific goals include stocking fish based upon fishing pressure (angler effort per lake surface acre), harvest, lake productivity and limnological characteristics, as well as special considerations (outlet and flood prone status, i.e. need for sterile fish). Some high-use lakes do not have enough dissolved oxygen to support rainbow trout during the winter months. In this case, only enough catchables are stocked to support a summer fishery. Catchable rainbow trout are stocked when a lake cannot produce sufficient numbers of catchables from stockings of fingerlings.

Optimize social and economic benefits from recreational fisheries:

An economic survey (1996) of the five major stocked waters in the Tanana valley estimated the net economic value at \$4 million (SE = 0.27 million). Although it was not possible to separate the contribution of rainbow trout from other stocked species, the net economic value of the stocking program exceeded the cost for these major fisheries (\$317,150) in 1996.

Objectives

Provide for an annual harvest of 35,000 and a catch of 100,000 rainbow trout.

Maintain a five-year average cost/benefit less than \$3/catch.

Past Evaluation Work

Early evaluation included monitoring growth of stocked cohorts, evaluating survival of various rainbow trout strains, and evaluating stocking methods. Many stockings were set up to evaluate growth and survival of rainbow trout when stocked in small lakes at various sizes, in combination with other stocked species, or when managed with special angling regulations. More recent evaluation has included comparison of survival, growth and longevity for triploid and diploid rainbow trout. Recent studies are summarized below:

Generally, survival to catchable size increases when larger fish are stocked. Larger fish, however, cost more to produce and the improvement in survival does not always offset the higher cost. To meet angler demand, catchables are stocked in lakes that cannot produce sufficient numbers of catchable rainbow trout from stockings of fingerlings.

Some lakes exceeded optimal, but not lethal, temperatures during extended periods of the summer. Rainbow trout are stocked in these lakes because they can tolerate higher temperatures compared to other species.

ADF&G hypothesized that multiple species stocked in the same lake would partition and make more efficient use of habitat which would result in more fish available to anglers. Stocking rainbow trout in combination with other stocked species (lake trout, Arctic grayling, and Arctic char for example) did not increase overall fish production as was hoped. However, stocking more than one species in a lake provided species diversity for anglers.

Little Harding, Coal mine #5 and Craig Lakes were managed for trophy-size fish for six years. Special regulations were adopted (unbaited, artificial lures only; bag limit of one fish, which must be 18 inches or greater; and fishing closed October 1 through May 14), and criteria for success as a trophy fishery were established where at least half of an age cohort must exceed 14 inches by age 4. None of the lakes met the criteria, as estimates of abundance and size at age indicated a lack of larger sized fish. Consequently, the department asks that Coal Mine #5 and Craig lakes be dropped from trophy management. Little Harding Lake will still be managed for large rainbow trout, at the request of anglers. Stocking densities have been lowered in this lake to decrease the population size, but increase the likelihood of growing larger fish.

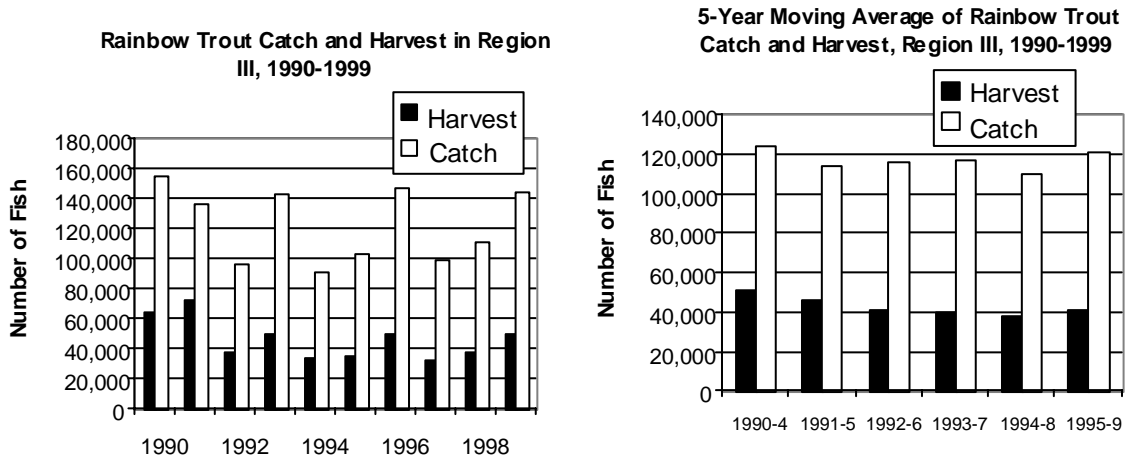
A rainbow trout stream fishery near Fairbanks was established in Piledriver Slough. More than 20,000 triploid catchables are released from May through July each year. Recent studies indicate that a portion of stocked fish move downstream shortly after being stocked and may leave the fishery. The department estimates that fewer than 50 fish per 1000 stocked actually leave the fishery. This is an acceptable loss considering the popularity of the fishery.

A popular spring fishery for rainbow trout occurs in Quartz Lake where fish attempt to spawn near shore in ice free areas. Fish concentrate in a small areas and are easily caught. Many anglers believe that a significant number of larger fish is removed during this fishery, which greatly reduces the number of large fish available during the remainder of the year. Stocking triploid all-female rainbow trout may provide fish that avoid the spring fishery, and provide a large number of fish for the remainder of the year. The triploid fish do not become sexually mature and probably will not be attracted to the spawning areas. Results from angler returns and creel surveys indicate that triploid fish largely avoided the spring fishery and are harvested during the remainder of the year. Growth of triploid fish is comparable to that of diploid fish.

Recent requests from anglers include special management regulations for Dune Lake (a remote fishery). Rainbow trout up to 24 inches have been captured in this lake, and the popularity of the fishery appears to be growing.

Catch and Harvest Summary

Since 1990, annual catch has fluctuated from about 90,000 to more than 154,000 fish. The five-year moving average is between 110,000 and 124,000 fish. Harvest over the same period has ranged from less than 33,000 to over 71,000 fish. The recent five-year moving average is about 38,000 to 41,000 fish.



Performance Related to Goals and Objectives

Rainbow trout are the most sought after stocked species by anglers fishing in Region III. The department has strived to increase sport fishing opportunity by stocking catchable size fish in high use lakes up to three times during summer. Also, the department now stocks lakes for summer fishing that normally do not support fish year round. This has allowed for the creation of some very popular “instant fisheries” in urban locations such as Ballaine Lake. In Region III the rainbow trout program is ranked above all other stocked species.

With a few exceptions, the overall performance of rainbow trout has been satisfactory. Stocking catchables has worked well in urban, put-and-take fisheries, and fingerlings have worked well in remote lakes that receive less angling pressure. However, the recent change from stocking catchable diploids to catchable triploids into Piledriver Slough has provided unpopular because the triploid fish are too small. This is a put-and-take fishery with little or no grow happening during the summer. The department would rather stock fewer but larger fish than continue stocking the current small size triploids. Triploids stocked into Quartz Lake are performing exceptionally well. These fish may grow as well as, or better, than their diploid counterparts, and may have live longer.

From talking with anglers, department staff’s impression is that anglers want the opportunity to catch large size rainbow. Currently, there are rural and remote lakes that are candidates for management as quality rainbow trout fisheries.

Recommendations

Continue catchable and fingerling rainbow trout production at current levels. If the creation of quality (trophy) rainbow trout fisheries results in fewer fish being stocked in one location, new

stocking locations will likely accommodate surplus fish. The stocking program in Region III is growing each year. Currently, 109 lakes in Region III are stocked with rainbow trout.

Produce larger triploid rainbow trout for put-and-take fisheries even if it means producing and stocking fewer of them.

A survey aimed at identifying angler preferences and rankings of stocked species is needed to guide program goals.

LAKE TROUT - 2000

Stocking History

The first documented stocking of lake trout in was the introduction of “about a dozen” fish from an unknown source into Harding Lake during 1939 and 1940. This was a joint effort between the Alaska Game Commission, the U.S. Fish and Wildlife Service, and the U. S. Forest Service. Harding Lake was stocked again in 1963, with 252 adults from Boulder and Two Bit lakes in the Alaska Range. In 1965 eyed lake trout eggs were also introduced into Harding Lake from Susitna Lake, which were incubated at the Fire Lake Hatchery in Anchorage. Kettle Lake in the Glennallen area was stocked with lake trout from Fire Lake Hatchery (Susitna Lake Brood source) in 1967. Adult lake trout were also transferred from Monte Lake into Harding Lake during 1965. In 1988, lake trout reared at Clear Hatchery (Paxson Lake broodstock) were introduced into several lakes in the interior. Harding Lake now hosts a trophy lake trout sport fishery, where fish in excess of 30 pounds have been caught.

Historical records also indicate that lake trout have been transplanted to other locations of the State. In 1969, 204 adult lake trout were transplanted from Skilak Lake to Upper Summit Lake in the Kenai River drainage. In addition, an experimental freshwater commercial fishery occurred in the Bristol Bay area during the 1960’s (Lake Iliama, Lake Clark, Naknek Lake, and Tikchik Lake), of which lake trout were an important component of the commercial catch.

Clear hatchery began rearing lake trout in 1987 in order to develop culture methods and evaluate the potential for development of lake trout fisheries. In 1988, fingerling lake trout were introduced into many Region III lakes. The egg source initially was Paxson Lake, but was changed to Seven Mile Lake in 1993.

Existing Program

When Clear Hatchery closed in 1997, lake trout incubation and rearing was moved to Ft. Richardson. The department now conducts eggtakes every other year at Seven Mile Lake. The change from taking eggs every year to every other year reduced the number of eggs that are removed from the population at Seven Mile Lake. Every other year stockings can maintain the current lake trout fisheries. The department now conducts lake trout and Arctic char eggtakes on alternate years, which reduces expenses, frees up hatchery resources and still maintains the fisheries.

Typically, lake trout have been stocked from 4 to 8 inches. The size range reflects the hatchery experimenting with culture methods and “pushing the envelope” on size. Recently, the department has changed from stocking a large number of fingerlings to stocking fewer numbers of subcatchable and catchable lake trout. This benefits the wild populations because fewer eggs are removed.

Current eggtake requirement is about 80,000 eggs. This represents about 15% of the population egg production at Seven Mile Lake over two years. Last year about 35,000 subcatchables were stocked in a dozen lakes and this year about 8,500 catchables will be stocked in 3 lakes.

Region III – Summary of Existing Program

Currently, about 24,000 subcatchable (5 inches) and 4,500 catchable (8 inches) lake trout are stocked in Region III. Subcatchable and catchable fish are stocked on alternate years. The majority of lake trout are stocked as subcatchables into 9 rural lakes along or near the road system. Catchables are stocked into only two lakes (Harding Lake and Lost Lake). Both are rural roadside lakes. Harding Lake receives the majority of the catchables (4,000). Only two remote lakes are stocked with lake trout (Crystal Lake and Kenna Lake).

Program Mission

Stock a species that is not commonly found along the road system near population centers.

Stock a long-lived species that has the potential for attaining a large size.

Provide an acceptable fishery for an acceptable cost.

Program Goals

Conservation of wild stocks of sport fish:

Divert fishing pressure from wild populations where we may have conservation concerns to stocked populations with no conservation problems.

Provide a diversity of recreational fishing opportunities:

The stocking program provides a unique opportunity for a large number of anglers near population centers. Lake trout are slow-growing, long-lived fish that attain large size and are found in only a few distant roadside lakes. If not for the stocking program most resident and non-resident anglers would be restricted to fishing for lake trout in select areas (such as Paxson and Tangle Lakes areas). Current sport fishing regulations for most lake trout populations are designed to manage for large fish and have minimum size restrictions. Lake trout fishing along the Dalton Highway corridor is catch-and-release. The stocking program provides the opportunity to catch large lake trout and the ability to harvest smaller lake trout closer to population centers. Except for Harding Lake the stocking program probably can't produce the 15-pound plus fish that are attractive to anglers. For these fish to attain large size they need large, deep lakes and low harvest levels so they can live long enough to attain large size. There are, however, a few stocked lakes that are producing lake trout larger than 24 inches (600 mm).

Optimize social and economic benefits from recreational fisheries:

An economic survey (1996) of the five major stocked waters in the Tanana valley estimated the net economic value at \$4 million (SE = 0.27 million). Although it was not possible to separate the contribution of rainbow trout from other stocked species, the net economic value of the stocking program exceeded the cost for these major fisheries (\$317,150) in 1996.

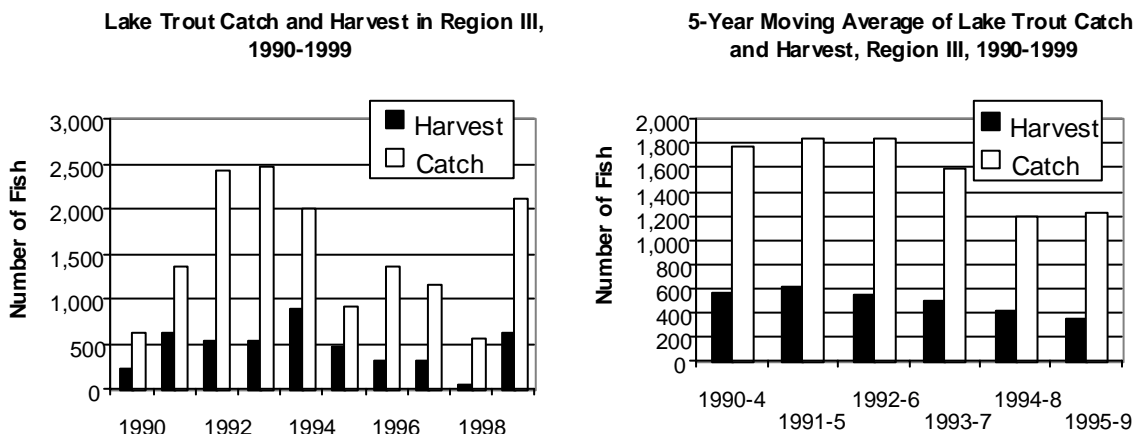
Objectives

Provide for an annual harvest of 1,800 and a catch of 5,000 lake trout.

Maintain a five-year average cost/benefit less than \$3/catch.

Catch and Harvest Summary

Since 1990, annual catch has fluctuated from about 625 to more than 2,400 fish. The five-year moving average is between 1,200 and 1,838 fish. Harvest over the same period has ranged from less than 60 to over 880 fish. The five-year moving average is about 350 to 620 fish.



Past Evaluation Work

When the program started the department did not know much about the culture or stocking of lake trout. While culture methods were being developed in the hatchery, biologists were also conducting field trials. Most stocking evaluation work was set up to evaluate growth and survival of lake trout when stocked in small lakes with other stocked species.

Lake trout (and Arctic char) did well in most lakes except when stocked in shallow low-elevation lakes. High temperatures and lack of a cool refuge seemed to be the best predictor of unsuccessful stockings.

Department staff hypothesized that multiple species stocked in the same lake would partition and make more efficient use of habitat which would result in more fish available to anglers. Lake trout in combination with other stocked species (rainbow trout and Arctic char) did not increase overall fish production as hoped.

Lake trout stocked into small (less than 50 acres) rural lakes in the Meadows Road and & Coal Mine Rd areas are growing to lengths in excess of 24 inches

Egg incubation boxes have been used in Seven Mile, Harding, and Donnelly lakes. Because lake trout are a long-lived species, it is difficult to evaluate the contribution of artificially incubated fish to the populations in these lakes. However, hatching success has generally been about 50%. Incubation boxes may be a cost effective method of enhancing lake trout production, particularly in remote lakes.

Lake trout reared in net pens in Harding Lake during 1990 grew to approximately 4 inches after 11 weeks. The average cost of all fish raised in net pens was about \$6.80 per pound, or 15 cents per 4-inch fish.

Performance Related to Goals and Objectives

Anglers enjoy the challenge and fishing diversity that lake trout provide, and associate lake trout fishing with the larger-sized fish available in Harding and Paxson Lakes. Since 1993, 23 trophy certificates have been issued to anglers who caught lake trout 20 to 33 pounds (9 to 14.9 kg) or greater, and 31 to 39.5 inches (787 to 1003 mm) long in Harding Lake alone. The opportunity to catch fish along the road system that are 12 pounds or larger is a unique and popular attraction. However, the population of lake trout in Harding Lake is relatively small, and stocking efforts are used to supplement natural spawning. The contribution of natural lake trout reproduction to the population in Harding Lake is unknown. Survival is thought to be very low because Harding Lake does not have the rocky shoals typical of lakes favored by lake trout. Juvenile lake trout also use shoals for protection. Most lake trout stocked into Region III rural lakes do not attain a size that exceeds 10 pounds. However, some small lakes (less than 50 acres) in the Meadows Road and Coal Mine Road areas are producing fish in excess 24 inches

In Region III the staff have ranked the lake trout program above Arctic grayling, but below all other stocked species. The department does not know if anglers would prefer discontinuing lake trout production in the hatcheries in favor of expanding production of a more popular species.

Program Options and Recommendations

Lake trout are providing a benefit in Region III but they are one of the lesser desired species. If the resources at Ft. Richardson and Elmendorf hatcheries are completely utilized, then any new program or expansion of an existing program will require reduction or elimination of an existing program.

Lake trout and Arctic char provide similar benefits (long life and large size). Substitution of Arctic char for lake trout would reduce species diversity but it would free up space at the hatchery for increasing the production of another species.

End lake trout production at the hatcheries. If enhancement is needed, lake trout eggs can be incubated in egg boxes placed in lakes. The department has developed culture methods for producing lake trout in hatcheries and in the future, if needed, the hatcheries can start producing lake trout again.

NOTES FROM HATCHERY REVIEW - 2000

Stocked Lakes Monitoring Plan

Most department staff agree that lakes need to be monitored on a periodic basis. Benefits include: observing the performance of stocked fish, communicating with anglers, ensuring that healthy fish are stocked, identifying need for making adjustments to the stocking program, and quickly identifying problems. Monitoring is area responsibility.

Cost/Benefit Analysis

The foundation for a cost/benefit analysis has been established. Statistics on some fisheries look impressive while others look to be very expensive. The focus of this exercise was not to identify expensive projects and cancel them, but to identify expensive projects and see if there is a way to make them more cost effective.

Northern Pike in Stocked Lakes

Discussed the problem of northern pike showing up in stocked lakes. Discussed the need to have a standardized approach or course of action. Department staff will develop a northern pike

action plan utilizing the same format as the lake category table in the Stocking Plan. The northern pike action plan will be added as an addendum or appendix to the Lake Stocking Policy.

Lake Trout

The lake trout program is small. Raising lake trout to catchable size at Fort Richardson creates a measure of added risk for disease outbreaks. Following a lengthy discussion, it was decided that the lake trout program should be discontinued. If future need arises, lake trout may be reared to the fingerling stage without increasing disease risks. Don Bee will write up a summary of lake trout rearing protocol in case we ever need to rear lake trout again. The eggtake scheduled for fall 2001 will not happen.

Rainbow Trout

The subject of grading broodstock and discarding the smaller fish was debated. Staff decided that Fort Richardson Hatchery staff, Carmen Olito, and Genetics staff would write a broodstock management plan. This document should be done prior to the next eggtake. Fish size and grading production raceways were also discussed.

Production Alternatives

Two production alternatives, king x pink hybrid salmon and arctic char, were discussed. The hybrids have not performed as hoped. They have a high percentage of Age 1 males that die and some of those appear to be fertile. The hybrids also seem to be susceptible to disease. Staff agreed to discontinue production of hybrids, but to continue the evaluation of experiments in progress. Although hybrids do not appear to be good as a catchable product, they may work well if stocked as fingerling or subcatchables. Arctic char have performed better than expected. They rear well in the hatchery and do not need much warm water to grow. They are hardy and appear to like rearing at high densities. After much discussion, staff decided to drop 50,000 catchable diploid rainbow trout and add 50,000 catchable arctic char. This will help alleviate some disease risks in the hatchery and serve as a test to see if arctic char perform as well as rainbow trout in some of our smaller lakes. An arctic char broodstock will be reared at the hatchery. Probably need 2 more wild eggtakes to get enough brood years for viable broodstock. Another Arctic char eggtake will be conducted at Lake Aleknagik in fall 2001.

SECTION VIII: PROJECT SUMMARY 1999-2000

COMPARISON OF DIPLOID AND TRIPLOID RAINBOW TROUT STOCKED IN QUARTZ LAKE

A popular rainbow trout fishery occurs at Quartz Lake in the spring. As the ice on Quartz Lake recedes, rainbow trout attempt to spawn in shallow, near shore water. The fishery is gaining popularity because large fish are concentrated in a small, easily accessed area and are readily caught. The fishery occurs along the beach at the state recreation area, between the two boat-launch sites which are about 100 yards apart. Anglers line up along the shore and even walk out on the ice to catch fish. Rainbow trout are probably attracted to this and other similar sites due to the presence of upwelling ground water.

Anglers believe that a significant portion of the population of large rainbow trout is harvested in the spring fishery, reducing the number of large fish available for harvest during the rest of the year. They are concerned that the quality of fishing has recently declined due to the increasing popularity of the spring fishery. Although an increasing number of large fish are probably

removed during the spring fishery, there is no conservation problem because all fish in Quartz Lake are stocked, and rainbow trout do not successfully reproduce in the lake.

ADF&G was asked if it is possible to develop a group of fish that avoid the spring fishery and provide for angling opportunities for large numbers of fish during the rest of the year. The department elected to conduct an experiment to determine if triploid all-female rainbow trout will provide such a fishery. Triploid rainbow trout are sterile. Because they do not become sexually mature they should not be attracted to a spawning site where they would be exposed to intense fishing. Triploid males were not used because they do show external signs of sexual maturation and a portion of the males does attempt to spawn. The normal female and male fish stocked in Quartz Lake are diploid (2N).

Results and Discussion

During the study, 600 rainbow trout were inspected and measured. There were 30 fish with left ventral clips (3N) and 47 fish with right ventral clips (2N). The proportions of 3N fish captured in the spring and summer fisheries were 0.18 (SE = 0.059) and 0.67 (SE = 0.083), respectively. The proportions of 2N fish captured in the spring and summer fisheries were 0.82 (SE = 0.059) and 0.33 (SE = 0.083), respectively. Mean lengths of 2N and 3N rainbow trout were about 15.5 inches FL.

These results suggest that 3N fish were less likely to contribute to the spring fishery compared to marked 2N fish. However, after the lake was ice free, anglers disperse across the lake and 3N fish contributed more to the fishery. This may be the result of having harvested a large proportion of the marked 2N fish during the spring fishery, leaving less marked 2N fish available for harvest during the summer fishery. Conversely, most 3N fish may have simply avoided the spring fishery because they were not drawn to the boat launch area for spawning.

Some of the anglers that fished Quartz Lake recorded their catches. They also noted that marked 2N fish made up less of the catch compared to 3N fish within a month of the lake being ice free. Their records also show that the proportions of 2N and 3N fish in their catches became more equal as the season progressed.

ABUNDANCE AND COMPOSITION OF RAINBOW TROUT IN LITTLE HARDING LAKE

In 1994 ADF&G initiated a program to create fisheries for trophy size rainbow trout in Little Harding Lake (54 acres), Craig Lake (17 acres) and Coal Mine #5 Lake (12 acres). Special regulations were adopted for these lakes to increase the likelihood of creating successful fisheries. These lakes are open to fishing from 15 May through 30 September. Only unbaited, single-hook, artificial lures may be used. The daily bag and possession limit for rainbow trout is one fish which must be 18 inches TL or larger.

Success in establishing fisheries for trophy rainbow trout in Little Harding Lake, Craig Lake, and Coal Mine #5 Lake is based on size and relative abundance. For these fisheries to be considered successes, at least half of an age cohort must exceed 14 inches FL by age-4. When stocked, these fish are age 1 and average 6 to 7 inches FL. Prior to 1994, Little Harding Lake was stocked previously with rainbow trout and coho salmon. Now, only rainbow trout are stocked. Lake chubs *Couesius plumbeus* are also present in the lake. To date, only Little Harding Lake is approaching the criteria for a successful fishery. We have dropped Craig Lake and Coal Mine #5 Lake from the trophy rainbow trout program because these two lakes have not provided acceptable fisheries (Skaugstad 1999).

The purpose of this study was to estimate the abundance and size structure of the rainbow trout population in Little Harding Lake.

Results and Discussion

The unstratified estimated abundance of rainbow trout was 2,191 (SE = 329). Abundance was not estimated by size category or by age because staff biologists suspect that size bias likely occurred. Fish size during sampling in September ranged from 9.5 to 19 in FL.

RAINBOW POPULATION ASSESSMENT AT DUNE LAKE

Anglers have expressed concern that the number of large rainbow trout in Dune Lake has declined recently. Dune Lake is noted for producing rainbow trout in the 24 inches range, which makes this fishery popular with anglers in the interior and with visitors. Dune Lake is stocked with rainbow trout, landlocked silver salmon, and Arctic grayling. This fishery is maintained by stocking hatchery reared fish.

In 1999, the harvest of rainbow trout at Dune Lake was 2,006 fish, more than double the harvest level since 1990. During the experiment only 7 rainbow trout younger than age 3 were captured. These data indicate there was a relatively large increase in the number rainbow trout harvested from Dune Lake and there is no recruitment to replace these fish.

Results

A mark-recapture experiment was conducted at Dune Lake in 2000 to estimate the abundance and size composition of the rainbow trout population. The estimated abundance of rainbow trout was 472 (SE = 87) and land locked silver salmon was 1,028 (SE = 150). All the rainbow trout from which scale samples were collected were age-3 and the silver salmon were age-2. The average size of rainbow trout was 493 mm (19 inches) and the range was 420 to 621 mm (16 to 24 inches). The average size of the silver salmon was 395 (15.5 inches) mm and the range was 273 to 445 mm (11 to 18 inches).

Discussion and Recommendation

It appears that the decline in the rainbow trout fishery observed by anglers may be the result of predation on stocked fingerlings and increased harvest of adult rainbow trout. Possible solutions to increase the abundance of large rainbow trout in Dune Lake are to eliminate or reduce the number of silver salmon stocked into the lake and reduce the harvest of large rainbow trout. The elimination of silver salmon from the stocking program for Dune Lake will have the quickest effect on predation. However, if large rainbow trout are also a major predator on stocked fingerling, then the elimination of silver salmon may not have the desired result of reducing predation.

The current harvest level of 2,000 rainbow trout appears to exceed the capacity of the stocked population to sustain a constant number of large rainbow trout. From 1990 to 1998, an annual harvest less than 1,000 rainbow trout maintained an acceptable fishery. With the current number of anglers and level of effort, reducing the bag limit from 10 to 5 rainbow trout will reduce the harvest from 2,000 to 1,000 rainbow trout. However, if the number of anglers and the level of effort increases, the number of rainbow trout harvested under reduced bag limits may still exceed 1,000 rainbow trout.

FISH ERADICATION FROM J, CHET, AND NICKEL LAKES

In preparation to applying rotenone to remove unwanted longnose suckers, sport fish were captured and moved from J Lake, Chet Lake, and Nickel Lake and released in other stocked

lakes on Ft. Greely. The army constructed a dam at the outlet from J Lake to prevent longnose suckers and other fish from moving upstream into J Lake. The army also purchased two drums of liquid rotenone that are now stored at Ft. Greely. The army prepared an Environmental Assessment and a Finding of No Significant Impact for using rotenone to eradicate longnose suckers in these three lakes. The EA has gone through a public review process and the request for using rotenone was approved by the army. However, ADF&G staff have delayed application until various agencies have had a chance to address a study linking rotenone as causing symptoms of Parkinson's disease in rats.

SELECTION OF LAKES TO BE MANAGED FOR LARGE RAINBOW TROUT

In 2000, the department was charged with examining five lakes as candidates for management as fisheries for large rainbow trout (Bluff Cabin Lake, Monte Lake, Rainbow Lake, Donnelly Lake and Lisa Lake). The last three lakes were not examined due to conflicts with other projects and weather conditions. In addition to these lakes, others were surveyed to determine which lake and fishery characteristics would best predict a lake most likely to produce large rainbow trout.

Current data shows that several lakes are producing or are likely capable of producing large fish. Generally, lakes with the largest and greatest numbers of large fish are more remote. More remote lakes usually have fewer visits by anglers, lower stocking densities, probably more abundant food, and larger fish comprise a large proportion of the population compared to more easily accessed lakes. The department has found no single defining lake characteristic such as alkalinity or littoral area among the several lakes examined that would suggest one lake is more likely than another to provide a successful fishery for large rainbow trout.

Quartz Lake has the highest alkalinity measured in the interior, over 200 ppm. It also produces the largest fish (>20 inches) along the road system. Dune Lake is remote and has a moderate level of alkalinity (68 ppm). It also produces rainbow trout over 20 inches. Tschute Lake, a new lake to the stocking program, has some of the fastest growing rainbow trout in the interior. Its alkalinity is low, 12 ppm. All three lakes produce large or fast growing rainbow trout, have different levels of alkalinity but all have abundant scuds and aquatic insects. Other lakes in the interior have produced rainbow trout over 20 inches but these lakes are quickly fished out when anglers learn large fish are present. Other lakes with high alkalinity (~100 ppm), such as Chena Lake, do not produce large rainbow trout.

The task for the department is to find a lake that is capable of producing sufficient numbers of large rainbow trout. The production of large rainbow trout is determined by food availability, life span, genetics, and water temperature. Fishery managers can control the first three factors; however, temperature is left to nature. Genetics is controlled through selection of fish stocks that demonstrate superior growth. The hatchery program in Alaska has settled on the Swanson River strain because it performs adequately in the hatchery and after stocking. These fish have grown in excess of 10 pounds. Each year that a fish is alive it grows. Fishery managers can allow more fish to attain older age by reducing harvests. The amount of food in a lake is left to nature. However, fishery managers can control the amount of food available to each fish by adjusting stocking densities. By stocking fewer fish the amount of food available to individuals increases.

In British Columbia a simulation model was developed to help recreational fisheries managers determine appropriate regulations and stocking rates for sustainable fisheries for trophy-size rainbow trout in lakes (Naito 1992). The model included interactions among fishing, stocking, growth, maturation, and natural mortality rates which combine to determine fish size and

abundance. Simulation results indicated that a slot limit or a maximum size limit, each with a daily bag limit of one or two fish, yielded higher trophy catch rates than catch and release and minimum size limit regulations. An illegal harvest of only 15% was shown to severely impact the success of a trophy fishery.

In summary, the best combination of predictors are lake and angler characteristics such as low effort relative to lake size or low harvest of large fish relative to abundance. Other contributing characteristics are the presence and abundance of scuds and large aquatic insects, low fish densities and probably the absence of other competing fish species.

SECTION IX: PROJECTS AND ACTIVITIES

Projects and activities within the Stocked Waters Program are separated into management and research categories. Generally, management projects and activities address management plans, the Five Year Stocking Plan, Fish Transport Permits, coordinating stocking activities, conducting eggtakes and lake surveys (outlet structures, mapping, measuring limnological characteristics, assessing land-lock status), etc. These projects do not require biometric review because no population parameters are estimated nor are hypotheses tested. Research projects usually require biometric review because population parameters are estimated or hypotheses are tested. These activities address estimation of abundance, survival, growth, length distributions or comparing a parameter between two or more populations or to a predetermined value.

The Stocked Waters Program staff works closely with the area managers to develop stocking plans specific to their area. Department staff discuss the direction the stocking program should take in the respective management areas, develop a stocking plan and decide on needed management and research activities.

MANAGEMENT PROJECTS

Fishery Management Plans

The present management plans for major stocked waters and small lakes are out dated. The stocking program has evolved beyond what was envisioned when the management plans were developed and stocking levels set. Hatchery production has increased (more fish and larger fish), and new products (triploids, all female, and hybrids) are available for stocking. Angler behavior is changing, too. Discussions with anglers in the field, at meetings, and at the Fish and Game office suggest that more anglers now practice catch and release and others are not targeting some species as they once did. Stocking densities are based on historic harvest levels. When harvest levels change, the fish population structures also change which can result in fewer large fish or an excess of some species. During mark-recapture experiments and creel sampling in recent years, department staff has noticed that fewer small fish are kept (Quartz Lake) and a large number of coho salmon are not utilized (Dune Lake). Adjusting stocking levels and changing harvest regulations can solve these problems. These changes can be addressed through updates to the existing management plans.

The department segregates small lakes by proximity to population centers (i.e. urban, rural, remote). These categories serve different needs. Currently, the department manages urban lakes for put-and-take high-yield fisheries. These are expensive but popular fisheries because they are stocked with catchable size fish and the lakes are easy to reach by a large number of anglers. Rural and remote lakes have different fishery characteristics and are managed differently.

Currently, the department has stocking plans for urban, rural, and remote lakes but there are no fishery management plans.

With increasing public interest in fisheries for large-size rainbow trout, the department should develop special management plans for Dune Lake, Tschute Lake and one or more lakes in the UTMA. Fisheries for large-size rainbow trout require stocking strategies and regulations different from those currently used in the stocking program. The objectives, goals, and management strategies for these new fisheries should be laid out in a management plan for large rainbow trout.

Inspection of Candidate Lakes

This year a number of new lakes are included in the stocking program. Some have not been inspected. Prior to stocking, all lakes must be inspected for presence of other fish species, evaluate landlocked status, and conduct depth, temperature, and oxygen profiles. These data are used to determine which species can be stocked, the appropriate size for stocking and number of fish to stock.

Net-Catch Sampling

The department has numerous requests from anglers for current information on the species and size of fish in our lakes in Region III. Anglers use this information to plan fishing trips. Each year we attempt to sample the fish populations in 10 or more lakes in the Fairbanks, Delta, and Glennallen management areas. Most of these lakes are stocked so there are usually no conservation concerns driving the need for information on these fish populations. However, anglers are interested in the species and the size of the fish in these lakes. The department also uses this information to update the *Guide to Stocked Waters*, internet web site, and lake informational leaflets. An additional benefit is that biologists are able to observe the fish populations in several lakes and get a rough idea of their status. From these observations the biologist can judge if a fish population needs further investigation and plan a study to address a specific concern.

Because a large number of lakes are investigated, staff are constrained by the amount of time that can be spent at any one lake. The minimum amount of information that is needed (species that are present and their size range) often can be obtained with single sampling events. This method minimizes the time and resources necessary for sampling. The management objective for this project is to collect data on the size of fish that are present in various lakes and note their physical appearance and the presence of any species that were not stocked. This activity is often combined with other investigations such as those described below.

Lake Mapping and Limnology

Each year department lists a number of lakes to map or inspect. The actual number of lakes that are visited depends on the time available, the priority of other projects and for some lakes if aircraft or ATVs are available. Lakes are surveyed to obtain depth data for producing bathymetric maps for anglers and to describe morphology and other lake characteristics for fishery managers. While staff are at these lakes they often accomplish other activities such as net sampling (described above), water chemistry assays, dissolved oxygen and temperature profiles, and evaluate land lock status.

Statewide Stocking Plan: Region III Update

The five year stocking plan for Region III is updated each year in response to public comment, changes in Fishery Management Plans and hatchery production, and to comply with current

policies. Comments received from the public and current policies are reviewed to determine what changes will be required to update the stocking plan each year. The updated stocking plan for Region III was submitted to Sport Fish Headquarters in November for inclusion into the draft Five Year Statewide Stocking Plan for Recreational Fishing. Public comments and additional changes have been addressed to the draft and the plan should be published and available by 1 February 2001.

A summary of planned stockings for the Region III is maintained at the region office in Fairbanks. In addition to the information listed in the Five Year Stocking Plan the summary also includes the brood stock, average weight, desired stocking date, and Fish Transport Permit (FTP) number. This information is not listed in the Five Year Stocking Plan but it is important to hatchery managers and fishery managers for planning hatchery operations and monitoring the stocking program.

Fish Transport Permits

Each fish stocking and eggtake activity requires a Fish Transport Permit. The Five Year Stocking Plan, regional management plans, and active FTPs are crosschecked prior to stocking or taking eggs to determine if an active FTP exists. Any FTP needed for stocking or for an eggtake is submitted for approval. For 2001 there were 71 actions addressing changes in hatchery production, brood source, number and size of fish to be stocked, and expiration dates. A list of active, expired, and pending FTPs is maintained at the Fairbanks office.

Hatchery Review

Fish hatchery management and operational plans for state fish hatcheries on Ft. Richardson and Eielson Air Force Base are reviewed to ensure the plans account for the correct number, size, species, brood stock, and other special requirements for fish requested through the Five Year Stocking Plan and regional management plans. Requests from the various regions are checked against hatchery production capabilities to determine if requests are feasible. Hatchery and stocking managers discuss options to decrease impact of eggtakes on wild donor stocks and to make the stocking program more efficient. In November 1999, the Arctic char and chinook salmon programs were reviewed by statewide staff. In November 2000, the rainbow trout and lake trout programs were reviewed. These reviews are summarized in Section VII. In fall 2001, the Arctic grayling program is scheduled for review.

Fish Barriers

Fish barriers are installed at Birch Lake, Little Harding Lake, and Hanger Pit which allow water to flow out but block fish passage into these stocked lakes. These barriers are inspected each year and maintained to ensure that fish cannot pass into or out of these lakes and that the water flow through the weirs is not blocked by debris. Several lakes in the Glennallen area also have fish barriers. Last year department staff examined barriers on several lakes and found some of the barriers inadequate. All barriers will be inspected every two years.

Fish Marking

No current studies require marked cohorts of fish. However, any future lake trout or Arctic char stocked into Harding Lake should be marked in case the department later decides to assess the contribution of hatchery and wild fish to the harvest or document the occurrence of Arctic char natural reproduction. Estimated cost of marking these fish at Ft. Richardson Hatchery is \$800 for lake trout and \$2,000 for Arctic char. This year the department ended the lake trout stocking program so marking is not required in the foreseeable future.

This year the department will stock 5,000 catchable-size all-female triploid rainbow trout into Quartz Lake. These fish should be marked to allow the department to later assess growth and contribution of these fish to the fishery. A study can be developed to follow these fish using knowledgeable anglers who record their catches. Estimated cost of marking these fish at Ft. Richardson Hatchery is \$800.

CURRENT RESEARCH PROJECTS

Chinook/Pink Salmon Hybrid

The status of the hybrid salmon program is unknown. During the hatchery review meeting last November the staff decided that the program should be eliminated (see above *Notes from Hatchery Review - Production Alternatives*). These fish, however, have performed exceptionally well during the winter fishery and the status of the program is under review.

Last Fall, about 500 hybrid salmon and 500 chinook salmon were stocked into Sheefish Lake on Ft. Greely. This winter department staff will conduct a study to compare catch rates between hybrid and chinook salmon. Originally, two lakes on Ft. Greely and two lakes near Glennallen were to be stocked. The lower number of fish stocked was the result of poor survival in the hatchery. The fish twice were infected with disease after they were placed in outdoor raceways.

NEW RESEARCH PROJECTS

Quartz Lake Rainbow Trout Population Assessment

This fall and winter, anglers are reporting catching and seeing fewer Age 1 rainbow trout than in previous years. A similar phenomenon was observed at Dune Lake by staff biologists last summer. However, at Tschute Lake, near Dune Lake, Age 1 rainbow trout are abundant. After discussing the situation with anglers and Professor Joe Margraf at the University of Alaska Fairbanks the consensus is that coho salmon are preying on juvenile rainbow trout. Coho salmon are present in both Quartz Lake and Dune Lake but are not present in Tschute Lake.

The abundance of Age 1 rainbow trout can be estimated with a two-sample mark-recapture experiment this spring. This project must be completed prior to mid-June before the lake temperature exceeds 15°C and the larger fish avoid the shallow, warmer water. To determine if coho salmon prey on juvenile rainbow trout the stomach contents of coho salmon will be examined prior to and following the stocking of rainbow trout this summer.

Quartz Lake Arctic Char Population Assessment

Arctic char are popular at Quartz Lake because of their size (20 inches and larger). But last year few Arctic char of any size were caught or observed. The department can conduct a mark-recapture experiment to assess the Arctic char population in conjunction with the rainbow trout study. In addition to fyke nets, which are commonly used to capture rainbow trout, tooth or tangle nets will be used in water deeper than 10 feet to catch Arctic char which may avoid shallow water where fyke nets are used.

Tschute Lake Rainbow Trout Size At Age

No fish were present in Tschute Lake prior to it being stocked with rainbow trout in 1999. The average size of these fish in June 2000 was 7 inches. Growth is exceptional compared to other rainbow trout populations in the Tanana Valley. Tschute Lake is a candidate for special management to create a fishery for large (20 inches) rainbow trout. To determine that the lake is producing large rainbow trout, the department needs to sample the rainbow trout population in 2001 and 2003. The most efficient sampling design will require only one capture event to obtain

a sample of fish for measurement. This study should occur in early spring before lake temperatures exceed 15°C. Length data will be used to determine if these fish exceed 20 inches by Age-3 and to estimate the survival and growth of the second cohort which will be stocked this summer.

Evaluation of Two-Sample Mark Recapture Methods

The current procedure for two-sample mark-recapture experiment uses carbon dioxide or clove oil to anesthetize fish for marking. After each individual is marked, it is released in to the lake before it has recovered from the anesthesia. Marking is done while the boat drifts across the lake as a means to promote mixing of marked and unmarked fish. This method is efficient but it may not be appropriate. While collecting dissolved oxygen (D.O.) profiles during summer, biologists have observed D.O. levels less than 1 ppm near the bottom of lakes. Anesthetized fish fall to the lake bottom where D.O. levels are lowest. Some fish may not recover if D.O. levels are too low. Mortality of marked fish results in abundance estimate that are biased high.

ANNUAL HATCHERY PROJECTS AND ACTIVITIES

Egg Takes

The Region III stocking program currently assists the hatcheries with eggtakes by capturing and holding fish until they are ready for spawning. When Clear Hatchery was closed in 1997, staff in the regional office assumed responsibility for conducting eggtakes in the Tanana drainage and the Upper Copper/Susitna drainages. Other assumed responsibilities include locating wild donor stocks, evaluating their population status, and collecting and holding adults until ready for artificial spawning. To fulfill these new responsibilities a new budget separate from other stocked water evaluation work was given to Region III.

Arctic Grayling

The objective for the Arctic grayling program in spring 2001 is to collect 20,750 fertilized eggs (about 6 females and 6 males) from the Our Creek population and 152,400 fertilized eggs (about 70 females and 70 males) from the Chena River population. Since 1965, ADF&G has collected eggs from wild stocks of Arctic grayling for stocking in lakes to enhance sport fishing opportunities. Gametes collected for the lake stocking program primarily have been taken from Arctic grayling migrating through Our Creek, which flows into Moose Lake in the Moose Creek drainage. In 1995, ADFG also began collecting gametes from Arctic grayling in the Chena River for stocking in specific lakes in the Tanana Valley and Mat-Su area. Eggs are collected in the spring and incubate at Ft. Richardson Hatchery. After artificial spawning, the adults are released returned to Moose Lake or the Chena River. The progeny are reared at the hatchery for up to one year. Fertilized eggs are collected every year from both stocks.

The FTPs for both eggtakes are approved. The budget will be submitted this spring along with the an updated operational plan will that will reflect any changes in the number of eggs required.

The department will investigate alternate locations near Glennallen where Arctic grayling can be captured. One possible location is Tolsona Creek behind the Fish and Game office in Glennallen. If fish can be captured and held for spawning then the department will not need to use the trail to Moose Lake/Our Creek. The use of the trail has become a contentious issue with two local land owners. Department staff from the Glennallen office and Ft. Richardson Hatchery will conduct the eggtake in Glennallen.

The department will use an electrofishing boat to capture Arctic grayling in the Chena River. The fish will be transported to Hanson Road Pond until they are ready to be artificially spawned. Department staff from the Fairbanks office will conduct the eggtake for the Chena River Arctic grayling.

Arctic Char

The objective for the Arctic char program is to collect 198,000 fertilized eggs (about 124 females and 124 males) from the Lake Aleknagik stock near Dillingham. Since 1986 ADF&G has captured Arctic char at Lake Aleknagik and collected fertilized gametes for the state wide stocking program. Eggs were collected in the fall and incubated at Ft. Richardson Hatchery during winter. After artificial spawning, the adults are released in to the lake. The progeny are reared at the hatchery for up to one year and are stocked as fingerlings, subcatchables, and catchables. Most fish are stocked into lakes in the Tanana Valley, UCUSMA and Mat-Su area. Fertilized eggs are now collected every two years.

In 2000, the egg take removed about 3% of the total estimated egg production for the Lake Aleknagik Arctic char population. This is an acceptable level of egg removal for this population. In 1997, ADF&G estimated about 9,700 pre-spawning Arctic char were present at just three locations and half of these (4,850) were female. Because the department intends to conduct biennial eggtakes, about 1.5% of the total estimated egg production is removed over two years.

In fall 2001 the department was scheduled to take eggs from the lake trout population at Sevenmile Lake. During the hatchery review in November 2000, the lake trout program was dropped. Instead the department will return to Lake Aleknagik for another Arctic char eggtake. The FTP will be updated to reflect any changes to donor and egg goals. The operational plan and budget for the eggtake will be developed and submitted this fall.

Lake Trout

The objective for lake trout *Salvelinus namaycush* in 1999 was to collect 88,000 fertilized eggs (about 84 females) from the population in Sevenmile Lake, which lies in the Tanana River drainage. Since 1987, the Alaska Department of Fish and Game (ADF&G) has collected eggs from wild lake trout populations at Paxson Lake and Sevenmile Lake. Eggs are collected in the fall and are incubated at state hatcheries during winter. After artificial spawning, the adults are released in to the lake. The progeny are reared at the hatchery for up to one year. These fish are then stocked as fingerlings, subcatchables, and catchables in several lakes in the Tanana drainage, UCUSMA and Mat-Su area to enhance sport-fishing opportunities.

In 1999, the egg take removed about 30% of the total estimated egg production for the Sevenmile lake trout population. Because the department recently began conducting alternate year eggtakes, only 15% of the total estimated egg production is removed over two years. This is an acceptable level for this population. In 1999, the department estimated 1,260 (SE 185) lake trout in the population 361 mm and larger (Parker 2000). Egg takes were conducted starting in September 1993 and occurred again in 1995, 1997 and 1999. The removal of potential annual production ranged from 12-26% during the four years eggs were collected (Parker and Wuttig 2001). An increasing trend in population size since 1995 indicates that removal of production is not having an adverse impact on the population.

FISH STOCKINGS

Fish stockings will start the third week in May, just prior to the Memorial Day weekend. The department tries to have catchable fish stocked right after breakup to meet pent-up angler demand and a surge in angler activity. Fish will be provided this spring for a fishing derby in Nenana and a Kids Fly Fishing Clinic at Twin Bears camp on the Chena Hot Springs Road. Fish also will be provided for Fishing is Fun Day. Staff volunteer their time to help with activities and represent the department at fishing clinics and Fishing is Fun Day.

Region III staff will assist the hatchery staff with transporting fish. Fish are offloaded from the hatchery truck to one or two pickups equipped with transport tanks. The pickups are used to stock the fish into ponds along the Steese Highway and Chena Hot Springs Road. The hatchery truck then delivers fish to lakes along the Richardson Hwy. ATVs are used to transport fish to lakes accessed by trail (such as the Coal Mine Road area) and chartered aircraft are used to reach remote lakes in the Kantishna River drainage, and other lakes near Delta and Glennallen.

REQUESTS FOR STOCKING

Northern Pike Transfers

The Air Force and the Alaska Department of Natural Resources requested that the department stock three lakes with northern pike. Because northern pike are not produced in hatcheries, they had to be capture from wild stocks. Last summer, the department surveyed seven lakes and gravel pits in the Fairbanks area for northern pike. Fewer than 24 northern pike were captured and transferred to Scout Lake on Eielson Air Force Base. About 100 pounds of lake chub and longnose suckers were transferred from Lost Lake to Scout Lake as forage for northern pike.

This project, if continued, would be more efficient if a nursery lake for northern pike could be established on Eielson Air Force Base. The juveniles would be captured and released into other locations. Forage fish can easily be collected from Lost Lake. Special management regulations restricting harvest likely would be required to allow the northern pike to attain large size.

Additional Lakes

The Paxson Advisory Committee has requested that the department stock additional char in Dick Lake and stock some species in addition to Arctic grayling into Meiers Lake. The Paxson AC informed the department that Dick Lake is receiving too much angling pressure to sustain a viable fishery with the current alternate-year stocking schedule. Possible solution is to stock Arctic char every year now that the hatchery is increasing Arctic char production and collecting eggs every year.

The Delta AC has requested that the department stock more lakes with Arctic char in the UTMA. Some committee members indicated that they are willing to reduce rainbow trout stockings if they can get additional Arctic char. The Delta AC is interested in the salmon hybrid for their area.

The Tok AC has asked that we inspect two gravel pits along the Alaska Highway near Tok for stocking. This can be scheduled summer 2001. They have requested rainbow trout and Arctic char.

The department received a request to stock Chena Marina. The property/home owner's association agrees to stocking. A letter of agreement is coming from the home owner's association. The department will provide signs requesting anglers remain on shore and not use

boats or other floating devices on the lake. Scheduled for rainbow trout, Arctic grayling and Arctic char.

Square Lake in UTMA is a candidate for stocking. The department still needs first hand inspection for inlets and outlets, survey for other fish species, and a bathymetric map. These activities were scheduled for last year but weather and other projects prevented staff from making the trip.

Pippin lake in UCUSMA will be stocked with rainbow trout this year. Mullins Pit (100+ acres) on Eielson AFB has been added to the stocking program along with Parks 209 near Denali.

Last year the department surveyed Island Lake, along the Alaska Highway near the Canada border and concluded that it was not suitable for the stocking program. The lake contained northern pike and had an outlet.

OTHER STOCKING ISSUES

Removed Lakes

The department will remove Hanson Road Pond (Fairbanks) from the stocking list due to problems with access. The pond will still be used to hold Arctic grayling and Arctic char for eggtakes.

Large Rainbow Trout Fisheries

The department has received inquiries or requests from the public for fisheries for large rainbow trout. These are not people associated with Trout Unlimited, Midnight Sun Flycasters or other fishing organizations. Rather, they are individuals that want the department to provide more quality fisheries. Department staff have informed anglers that quality fisheries often require more restrictive bag limits to allow fish to live longer and grow larger. Generally, the anglers asking for quality fisheries are willing to accept reduced bag limits.

Piledriver Slough

The rainbow trout fishery in Piledriver Slough has deteriorated for the last five years. Anglers have commented that the stocked rainbow trout are too small. The hatcheries are experimenting with removing the small slow growing fish from the hatchery population to provide more room for faster growing fish. This should result in larger fish for stocking earlier in the year. Stocking large catchables (8 to 10 inches vs. 5 to 8 inches) in Piledriver Slough is intended to make the fishery more popular with anglers.

Aeration

A number of ponds occasionally go anoxic during winter. This results in fish kills and loss of fishing opportunity. Anglers and pond owners have asked if it is possible to prevent fish kills by supplementing lakes and ponds with oxygen. Department staff has provided technical assistance to a home owner at North Pole Pond. Currently, this person is experimenting with a small air pump to inject air into the lake. Department staff is measuring D.O. levels in the lake to measure the effect of air injection. The natural resources staff at Eielson Air Force Base is interested in the experiment because they manage popular lakes that have occasional fish kills.

ACCESS

The department received two letters from the public complaining about access problems at Silver Lake, Strelna Lake, and Sculpin Lake in the UCUSMA along the McCarthy Road. The department has easements from the McCarthy Road to Silver Lake and Sculpin Lake but current

land owners have actively prevented or made it difficult for anglers to access these locations. There is a trail to Strelna Lake that is on public land.

The Alaska Dept of Transportation is upgrading the intersection of the Richardson Highway and Badger Road. This will prohibit the current access to the Weigh Station Ponds from the Richardson Highway. A tentative agreement is being worked out between the U.S. Army Corps of Engineers, Fort Wainwright Environmental Resources Division and Department of Public Works, and the ADF&G divisions of Sport Fish and Habitat. The letter of agreement is working its way through the Army's system. The Army will allow access to the ponds from a road on Ft. Wainwright.

During the public comment period for the Five Year Stocking Plan, the department received four letters asking that the department stop stocking Ballaine Lake. The comments generally focused on anglers leaving trash, fishing in areas used by ducks, making fire pits in ski trails and cutting trees. The University of Alaska supports the stocking program. The department and UAF are working on possible solutions to reduce litter by providing trash containers and placing signs asking anglers to not fish from certain areas.

Lake name and information signs are needed for lakes on Fort Wainwright, Fort Greely, Chena Marina and Ballaine Lake.

STAFF EDUCATION AND MEETINGS

Stocked Waters staff has requested training in the proper use of, safety precautions, and emergency response to hazardous material. This training is required for application of rotenone. Cost is about \$500 per individual.

Staff also request training for training in writing NEPA documents (National Environmental Protection Act). The content of NEPA documents is appropriate to the stocked waters program and new fishery management plans where impacts to wild species and environments exist and must be considered when introducing fish. Cost is about \$300 per individual.

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APPENDIX A

Appendix A.-Proposal submitted to the Board of Fish requesting regulation change for Dune Lake.

PROPOSAL 184 - 5 AAC 70.020 (b) CODE KEY FOR BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS and 5AAC 70.022 (d) (XX). TANANA RIVER PORTION OF THE ARCTIC - YUKON KUSKOKWIM AREA WATERS, SEASONS, AND BAG LIMITS.

Amend these regulations to provide the following:

Dune Lake: Daily bag and possession for rainbow trout is five fish. Only 1 may be over 18 inches.

PROBLEM: Dune Lake is a remote lake west of Nenana accessible by light aircraft equipped with skis or floats, or by snowmachines over a rough trail. It is stocked every other year with rainbow trout. Coho salmon and grayling are also stocked. Because rainbow trout grow to a large size in Dune Lake, it has become a popular fishing destination for guided and unguided anglers. Rainbow trout at lengths of 20 inches and greater have been consistently available in the past. Daily bag and possession limit is 10 rainbow trout, 10 coho salmon, and 5 grayling (no size limit). Catches and catch rates for rainbow trout are declining and it appears that large rainbow trout are less abundant, probably because of a combination of angler effort and variable survival of stocking cohorts of rainbow trout.

WHAT WILL HAPPEN IF NOTHING IS DONE? The high-quality rainbow trout fishery that Dune Lake is capable of producing will be intermittent or will decline to a lower level.

WHO IS LIKELY TO BENEFIT? Anglers who would like to work toward a consistent, high quality rainbow trout fishery.

WHO IS LIKELY TO SUFFER? Anglers who would like to keep more than 5 rainbow trout or more than 1 over 18 inches.

OTHER SOLUTIONS CONSIDERED? Stock more fish. ADF&G is reluctant to take this approach because stocking density may exceed the productive ability of the lake to produce large rainbow trout, resulting in an overabundance of small fish.

PROPOSED BY: Chuck Gray, Bud (H.C.) Weise, and 30 other individuals, all of whom fish at Dune Lake.

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Staff Comments:

Proposal No. 184, Page,134. 5 AAC 70.020(b). CODE KEY FOR BAG LIMITS, POSSESSION LIMITS AND SIZE LIMITS; and 5 AAC 70.022(d)(23). WATERS; SEASONS; BAG,POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS.
Amend this regulation to provide for the following:

Dune Lake: Daily bag and possession for rainbow trout is five fish. Only 1 may be over 18 inches.

WHAT WOULD THE PROPOSAL DO?

This proposal would reduce daily bag and possession limit and institute a size limit for rainbow trout in Dune Lake.

WHAT ARE THE CURRENT REGULATIONS?

Daily bag and possession limit for rainbow trout is ten. There is no size limit.

WHAT WOULD BE THE EFFECT IF THE PROPOSAL IS ADOPTED?

More large rainbow trout would be available in Dune Lake, and the cyclical nature of the rainbow trout catch would be moderated.

BACKGROUND:

Dune Lake is a remote lake west of Nenana accessible by light aircraft equipped with skis or floats, or by snowmachines over a rough trail. It is stocked every other year with rainbow trout. Coho salmon and grayling are also stocked. Because rainbow trout grow to a large size in Dune Lake, it has become a popular fishing destination for guided and unguided anglers. Rainbow trout at lengths of 20 inches and greater have been consistently available in the past. Daily bag and possession limit is 10 rainbow trout, 10 coho salmon, and 5 grayling (no size limit). Catches and catch rates for rainbow trout are declining or becoming inconsistent. Angler reports indicate that large rainbow trout are less consistently abundant. The cause is likely a combination of increased angler effort and variable survival of stocking cohorts of rainbow trout, coupled with the alternate-year stocking strategy and changes in hatcheries and brood sources.

DEPARTMENT COMMENTS:

The Department SUPPORTS this proposal. Ample opportunity exists to catch and harvest a combination of species. Dune Lake has a reputation for producing large rainbow trout. The present stocking strategy is cost effective and functional, but the potential exists to increase one aspect of the quality of the fishery (more consistently available large rainbow trout) without significantly reducing the other aspects of quality (opportunity to catch and harvest). This regulatory strategy may become a model for similar stocked lakes in the Tanana Valley.